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WAR IN EUROPE

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WAR IN EUROPE. The various aspects of the great war which broke out in 1914 will be discussed under the following captions:

I. UNDERLYING CAUSES OF THE WAR

- National Antagonisms
- Military Alliances
- Economic Causes

II. OUTBREAK OF THE WAR

- Austria's Demands
- The Serbian Reply
- Germany and Russia
- Germany and France
- Great Britain and Germany
- Question of Belgian Neutrality
- Italy's Position
- Japan's Position
- The Balkan States
 - Bulgaria
 - Greece
 - Rumania
- Portugal

III. MILITARY OPERATIONS

- Mobilization and Concentration
- Western Theatre
 - American Expeditionary Force
- Eastern Theatre
 - Russian Revolution
- Southern Theatre
- Southeastern Theatre
- Colonies

IV. NAVAL OPERATIONS

- Operations in the North Sea and the Waters about Great Britain
- Operations in the Mediterranean
- Operations in the Black Sea and Dardanelles
- Cruiser Operations in the Atlantic, Pacific, and Indian Oceans
- Naval Strategy of the War
- Some Naval Lessons of the War

V. AÉRIAL OPERATIONS

VI. ALLEGED ATROCITIES

- Belgium
- Armenia
- Poland
- Serbia

VII. DESTRUCTION OF ART AND ARCHITECTURE

VIII. NEUTRAL NATIONS

- United States
- Scandinavian Countries
- Netherlands
- Switzerland
- South American Countries

IX. RELIEF MEASURES

- Commission for Relief in Belgium
- Belgium Relief Fund
- Jewish Relief
- Other Funds
- Red Cross

X. FINANCIAL AND ECONOMIC ASPECTS

- International Exchange and Banking Problems
- Currency
- Employment and Wages
- American Foreign Trade
- World Trade
- Foreign Credits
- Prices and Food Supplies
- Cost of the War

XI. BIBLIOGRAPHY

- Historical Background
- Military Operations
- Naval Operations
- Aérial Operations
- Economic Aspects
- Finances

I. UNDERLYING CAUSES OF THE WAR

In July, 1914, the murder of Francis Ferdinand, a member of the Austrian royal family, set in motion a train of events which culminated in the terrible catastrophe of a great European war. It was clear, however, that this crime was not the real cause of the tremendous struggle which many of the statesmen and diplomats of Europe had anticipated and all had feared for many years. The underlying causes of this great War of the Nations reach far back into the past and cannot be reduced to any simple formula. Some knowledge of the important political and economic forces which have shaped the history of Europe during the past century is necessary for an adequate appreciation of the

causes of the great cataclysm. Among the many and complex influences which have been suggested as causes of the war, there are three forces which appear to have contributed most directly in bringing about the critical situation in Europe in 1914. These were (1) the clashing of national interests and ideals, (2) the maintenance of a system of military alliances, and (3) the economic rivalry among the nations of Europe.

National Antagonisms. Viewed broadly, the political history of Europe in the nineteenth century centres about two movements which were the inheritance of the French Revolution and the Napoleonic wars, (1) the growth of democracy and (2) the realization of national liberty. When the diplomats of the Great Powers met at the Congress of Vienna in 1815 to readjust the map of Europe, many expressed the hope that the Congress would be guided in its work by these two principles. There was much talk of "the reconstruction of the moral order," "the regeneration of the political system of Europe," of the establishment "of an enduring peace founded on a just distribution of political forces," and of the formation of an effective and permanent international tribunal. Unfortunately these fair promises were not realized and the Congress, instead of establishing a new era, did its utmost to restore the old one. The principles of popular freedom and national liberty were ignored wherever it was necessary to do so to satisfy the dynastic and personal influences which dominated the Congress.

In the first place, as an inheritance of the French Revolution these principles were anathema to the reactionaries and, in the second place, Metternich (q.v.), the Austrian Chancellor who dominated the Congress, realized that encouragement of the nationalist principle would endanger the heterogeneous Austrian dominions. (See VIENNA, CONGRESS OF.) There remained, at the close of the nineteenth century, a number of situations which clearly violated the principle of national sovereignty. The completion of German unity in 1871 was accompanied by the violation of the principle of French nationality in the annexation of the territories of Alsace (q.v.) and Lorraine (q.v.). (See FRANCO-GERMAN WAR.) It was an ever present challenge to the French people to attempt to regain these lost provinces and a constant reminder of the humiliation which they had suffered at the hands of Germany. On the other hand it was used by Bismarck (q.v.) and the Prussian military party to justify their programme of huge military armaments in Germany.

Nowhere else in Europe was the problem of nationality so acute during the nineteenth century as in Austria-Hungary. The very existence of the Austro-Hungarian Monarchy has been a constant challenge to the principle of nationality. Logically carried out this principle would mean the disappearance of Austria-Hungary and the distribution of its territory among the surrounding nations. The appreciation of this fact by the Austrian authorities made them apprehensive of all nationalist movements, and especially that of the southern Slavs. As will be seen it was the outgrowth of one of these movements which precipitated the crisis which led to the outbreak of the war.

The Balkan states presented a peculiarly vexing problem in the realization of the principle of nationality. The intricate mixture of racial

groups in this region made it an almost hopeless task to arrange geographical boundaries to correspond with national lines. The problem was complicated, moreover, by the clashing of the interests of the great European Powers, especially Austria and Russia, in this territory. The condition of chronic disorder and strife in this region during the nineteenth century was a source of almost constant concern to the diplomats of the great European states.

While the triumph of the ideal of nationality has done much to advance European civilization, it has not been an unmixed blessing. Too often national patriotism became a fetish. Love of one's country meant a lack of appreciation of or a contempt for the people of other countries; a feeling that the "kultur" of one's country was not only different from but distinctly superior to that of any other country. From this it naturally followed that it was a laudable ambition to wish to impose one's superior civilization upon an inferior people.

"If it were possible," says Prince Bernhard von Bülow (q.v.) in his book on *Imperial Germany*, "for members of different nationalities, with different language and customs, and an intellectual life of a different kind, to live side by side in one and the same state, without succumbing to the temptation of each trying to force his own nationality on the other, things on earth would look a good deal more peaceful. But it is a law of life and development in history that where two national civilizations meet they fight for ascendancy. In the struggle between nationalities, one nation is the hammer and the other the anvil; one is the victor and the other the vanquished." Prince von Bülow's words really go to the root of the whole trouble in European politics. They show clearly that exaggerated idea of the inevitable antagonism of national interests which dominated European politics during the nineteenth century.

In its extreme form this national spirit has found expression in movements to unite various related ethnic and racial groups into one political group. Such movements have been more or less prominent in Germany, Russia, and the Balkan states under the names Pan-Germanism, Pan-Slavism (q.v.), Pan-Serbianism, etc. It is doubtful whether any of these movements had passed beyond the state of vague aspirations held by a comparatively small group of people. As a contributing cause of the war the Pan-Slavic and Pan-Serbian movements were of some importance. The growth of such propaganda was a source of concern to Austria-Hungary, with its large Slavic population.

Pan-Germanism.—The Pan-German movement was an outgrowth of German imperialism and of the exaggerated race consciousness of the Germans. Roughly stated, this movement conceives the German people wherever located as forming one great nationality. Some Pan-Germanists deny any political or territorial ambitions and assert that they wish merely to spread the knowledge of German culture throughout the world. Others, more radical, proclaim the ultimate domination of the world by the German race. The German authorities have repeatedly stated that the Pan-German movement has no official sanction and that it is the work of only a very small part of the German people. However, what the movement has lacked in numbers it has made up in activity. Prominent historians, scientists, and other writers have ex-

pounded its views, while numerous societies have been formed to advance German ideas of culture and civilization throughout the civilized world.

Military Alliances. The obsession of national jealousy led inevitably to the view that it was necessary to defend nationalism with huge armaments. The remarkable success of Bismarck in uniting Germany by a policy of blood and iron was used as an object lesson by the militarists of Germany and other nations. War was glorified as an institution in itself, not simply as a means to an end. Says Bernhardt,* one of the leading exponents of this school, "War is in itself a good thing. It is a biological necessity of the first importance." And again, "The inevitableness, the idealism, the blessing of war as an indispensable and stimulating law of development must be repeatedly emphasized." John Adam Cramb,† an English historian, predicted a war between Germany and England and warned England to prepare for it. Everywhere the doctrine of military preparedness was advocated and it bore fruit in the tremendous standing armies and huge navies of the different European countries. It led also to the grouping of the great European Powers into two hostile military alliances.

When the representatives of the European Powers met at the Congress of Vienna in 1815, there was organized the so-called Concert of Europe, by which it was hoped that the problems of European politics would be adjusted. For some years Congresses representing the Great Powers were held at which international questions were considered and efforts made to maintain the balance of power in Europe. After the middle of the nineteenth century, however, the influence of this Concert was materially weakened.

A political transformation of Europe occurred in the decade between 1860 and 1870, culminating in the creation of two new European states, Germany and Italy. The appearance of these two states in the family of European nations seriously disturbed the old political relations. Bismarck, who had been largely instrumental in the creation of the German Empire, adopted as his guiding principle a system of firm alliances rather than dependence upon the more loosely constituted European Concert. In an effort to isolate France, he first strove to unite Russia, Germany, and Austria in a defensive alliance. When Russia withdrew from this alliance on account of antagonism to Austria, Bismarck devoted his efforts to binding together more closely the two Teutonic Powers. Italy later (1882) joined with the Central Powers to form the Triple Alliance (q.v.).

This organization of the states of central Europe into a strong military alliance was an

invitation to the other states of Europe to create an opposing alliance in order to maintain the balance of power. First France and Russia, drawn together by mutual hostility to Germany, formed a Dual Alliance (1895) and finally Great Britain, aroused by the threatening naval policy of Germany, abandoned her policy of "splendid isolation," and joined with France and Russia to form a second diplomatic group known as the Triple Entente (q.v.). The formation of these two rival military groups created a situation in Europe where every disturbance of the political or diplomatic status quo brought on a crisis. Since 1905 Europe has passed through several such crises, each one increasing the tension among the Great Powers and each making the maintenance of peace more difficult.

The first of these crises came in 1905 in a dispute over Morocco. A part of the understanding reached between England and France in 1904 provided that France should have a free hand in Morocco, while England was given a free hand in Egypt. Germany, which had abandoned Bismarck's policy of opposition to colonial expansion, was looking about for such stray portions of undeveloped land as had not been appropriated by England and France. Germany had to choose between two courses. Either she could frankly recognize the inevitable consequences of her geographical position and her late entrance into the field as a colonial power, which handicapped her development as a world state, or she might determine to challenge the more fortunately situated and longer established world Powers and create for herself a larger "place in the sun." She chose the latter alternative. With a rapidly increasing population, it became a question whether even her remarkable industrial development would accommodate the added millions of population. It is true that at this time Germany imported unskilled agricultural labor from Russia, and that there was no alarming emigration from Germany. But the future held out the prospect of a large emigration of Germans to other countries, and the Germans resented the loss of this good German stock to the Fatherland. Colonies where Germans might be kept under German control were felt to be the great need. Germany therefore determined not to stand quietly by and allow further colonial acquisitions by the other great European Powers without making an effort to share in the spoils.

The Russo-Japanese War (q.v.) (1904-05) had revealed the military weakness and inefficiency of Russia. This situation made Russia's support of France much less valuable and Germany felt that it was an opportune time to assert her position in regard to Morocco. On March 21, 1905, the German Emperor, while on a voyage to Constantinople, disembarked at Tangier and encouraged the Sultan to reject the scheme of reforms proposed by France. He, moreover, succeeded in forcing France to submit the whole Moroccan question to a conference of the Powers held at Algiciras (see MOROCCO, *History*), in January, 1906. England firmly supported France and let it be known that any interference with France's predominant position in Morocco would be resisted by her. Italy, moreover, refused to support her ally, with the result that France scored a distinct diplomatic victory.

One phase of Germany's policy of colonial and commercial expansion contemplated the exten-

* Friedrich von Bernhardt, born (1849) at St. Petersburg, son of a German diplomat; served in Franco-Prussian War; general of cavalry and commander of the Seventh Army Corps (1908); retired (1909), but in 1915, during the European War, assigned to field command at his own request. His writings, for which he is known internationally, are concerned with German military progress and with an expected war for the advancement of Pan-Germanism and expansion. In English have appeared: *Cavalry in War and Peace* (1910); *On War of To-Day, Britain as Germany's Vassal, and Germany and the Next War* (all 1914); *The New Bernhardt: "World Power or Downfall"* (1915), a collection of articles written during the European War.

† John Adam Cramb (1862-1913), educated at Glasgow and Bonn; from 1893 to his death professor of modern history at Queen's College, London; also lectured at other institutions and gave private courses; author of *Germany and England* (1914) and *The Origins and Destiny of Imperial Britain and Nineteenth Century Europe* (1915).

sion of Teutonic commercial and political interests in the Balkans and Turkey. In this "Drang nach Osten" Germany, in conjunction with Austria, hoped to create a great economic, if not political, sphere of influence extending through the Balkans to Constantinople and thence through Turkey in Asia to the Persian Gulf. German engineers and German capitalists began to develop Turkish resources. German military officials trained the Turkish forces.

In July, 1908, a revolution, led by the Young Turks, broke out in Constantinople. Taking advantage of this situation Bulgaria annexed eastern Rumelia and declared her complete independence of Turkey. Austria felt the time opportune to annex Bosnia and Herzegovina, which had been placed under her administration in 1878 by the Congress of Berlin (q.v.). This action of Austria irritated Italy and aroused Serbia, which latter had hoped to bring these provinces, closely related to her in blood, into a Greater Serbia. Russia protested against Austria's violation of the Treaty of Berlin, but Germany stood by her ally, and Russia unprepared for war was forced to submit. The Teutonic allies had scored a distinct diplomatic success and another European crisis was passed.

Once again in 1911, the Moroccan question brought Europe to the verge of war. Germany had not accepted with good grace her diplomatic defeat at Algeiras, and watched with an increasing irritation the extension of French influence and control in Morocco. Germany complained that France was not observing the policy of equal commercial opportunity for all nations and on July 1, 1911, the German cruiser *Panther* appeared off Agadir. Both England and France likewise sent ships there, and for several months European peace hung in the balance. A compromise was finally reached whereby Germany recognized France's predominant position in Morocco while in return Germany received a part of the French Congo.

Hardly had this second Moroccan crisis been passed when the delicate balance in European politics was disturbed by the Turco-Italian War (q.v.). Disappointed in her desire to obtain Tunis, Italy turned her attentions to the neighboring Turkish province of Tripoli and gradually extended her economic interests there. Friction developed with the corrupt and inefficient Turkish authorities and in September, 1911, the Italian government demanded that Turkey place the provinces of Tripoli and Cyrenaica under Italian control. Upon Turkey's refusal Italy declared war and after a long campaign succeeded in occupying the territory. Germany was placed in the difficult position of seeing her protégé Turkey despoiled by her ally Italy. She was, however, powerless to prevent Italy from carrying through her designs for fear that the latter might desert the Triple Alliance and join the Entente.

The Turco-Italian War was a prelude to a much more serious and far-reaching upheaval in the Turkish dominions. The policy of the Young Turks after the revolution of 1908, in attempting to build up a strong, unified Ottoman nation, stirred the smoldering embers of the rival nationalities in the Balkans. The Greeks, Bulgarians, Serbs, and Montenegrins resented the attempt to Ottomanize their fellow nationals in Macedonia and Albania. Putting aside for the moment their own rivalries these four Powers organized the Balkan League, and submitted

to Turkey a demand for far-reaching reforms in Macedonia. The European Powers quickly saw the danger of a European war if the Balkan situation was disturbed and they served notice on the Allies that under no conditions would they allow a modification of the territorial status quo in the Balkans. Undeterred by this threat of European intervention the Allies declared war on Turkey in October, 1912 (see BALKAN WAR), and after a series of brilliant campaigns, completely routed the Turks and drove them to the gates of Constantinople. As the Allies had anticipated, the European Powers did not make good their threat to restore the status quo. When it came to a division of the spoils the old rivalries among the Allies once more appeared. Serbia had been thwarted in her desire to obtain Albania by the opposition of Italy and Austria. This led to a demand by Serbia for a modification of the agreement for the divisions of the territory made by the Allies before the war. To this Bulgaria would not consent and Serbia, Greece, and Montenegro combined against their former ally. Rumania and Turkey also joined Bulgaria's enemies with the result that Bulgaria's forces were quickly overwhelmed. The struggle closed in August, 1913, and Bulgaria was forced to give up a large part of the conquered Turkish territory.

The outcome of the Balkan wars was a bitter disappointment to Germany and Austria. Not only had their protégé Turkey been practically driven from Europe, but the creation of a greater Serbia and the strengthening of Greece and Bulgaria checked the plans of Austria to reach the Aegean Sea at Saloniki. Russian influence, too, had been greatly increased in the Balkans by the strengthening of the Slavic states.

That Germany appreciated the serious blow which had been dealt to Teutonic influence in the Balkans was indicated by the introduction in February, 1913, of a new army bill which increased the peace strength of the German army by more than 100,000 men, and 19,000 officers. This was defended on the ground that the outcome of the Balkan wars had seriously disturbed the balance of power in central Europe to the detriment of Austria and Germany. France retaliated by increasing the term of military service in the French army from two to three years. Similar moves were made in Russia where it was proposed to increase the term of military service from three to three and one-quarter years, and in Austria where the standing army was increased by 100,000 men.

Thus at the opening of the year 1914, Europe was an armed camp. The Great Powers organized into two rival military alliances watched each other, waiting for the inevitable conflict.

Economic Causes. Some advocates of the economic interpretation of history seek to place all historical facts on an economic basis. To this school of historical writers this war is explained almost entirely on economic grounds. While it is quite possible to exaggerate this economic motive, there is no question that economic considerations played an important part in bringing about the situation which precipitated the European crisis. Some of these economic influences may be briefly stated.

At the close of the eighteenth century there occurred in Europe a complete transformation of industrial conditions known as the industrial revolution. The invention of improved

methods of spinning and weaving, the application of steam power, the substitution of the factory system for the former method of cottage industry, and the appearance of distinct capitalist and laboring classes were the most striking features of this revolution in industrial life.

England was the first country to feel the effects of this change. Factories began to turn out large quantities of manufactured commodities, more than enough to supply the home market. For a time England had a practical monopoly of the field, and had no difficulty in disposing of her surplus products in the markets of the world. But the industrial revolution in time reached other countries; France in the period after 1830, the United States in the period following the Civil War, and Germany in the period after 1880. The great industrial interests in these countries began to compete with those of England for the control of the markets of the world. England had the advantage of having vast colonial possessions which might serve both as a market for her manufactured products and as a field for the investment of surplus capital in the development of their natural resources. France and the United States, in a lesser degree, also enjoyed this advantage. Germany, on the other hand, because of her late appearance as a great power, was practically without colonial possessions of any potential value. She felt that her industrial development was being hampered through no fault of her own, but simply because the best parts of the world had been appropriated by other countries.

It has been argued, with considerable force, that a nation does not benefit commercially by the control of colonies or weak states. The case of Germany is cited to show how marvelously a state may expand commercially without colonies. But there is no doubt that certain economic interests within a nation do gain by national control of undeveloped parts of the world. There are government contracts to be let, franchises to be given, concessions to be granted, and possibly preferential tariffs to be established. The financial interests in close touch with the governmental authorities of a great power undoubtedly have a great advantage.

In the different crises which preceded the outbreak of the war it is urged, with much force, that economic considerations were predominant. German apologists insist that Great Britain welcomed the war as an opportunity to crush a dangerous commercial rival. It was pointed out that the adoption of preferential tariffs by the British colonies favoring British trade was an attempt to cripple German trade. The Moroccan disputes, it is maintained, were primarily due to the influence of German financial interests which felt that they were being discriminated against by the French authorities.

As to the Balkans, it is claimed that the economic rivalry of Austria (backed by Germany) and Russia was responsible, quite as much as the racial rivalry, for the state of chronic disorder in this region. It is maintained that the creation of the State of Albania at the end of the second Balkan War was primarily due to Austria, which country wished to thwart Serbia's effort to reach the sea and thus free herself from Austria's control of much of her export trade.

Again, the belief was prevalent in England that the forces behind the movement for the creation of a large German navy were the prominent financial interests which hoped to

use this new weapon to overthrow British commercial supremacy. In Turkey the extension of German financial interests in the years preceding the war occasioned rivalry with similar interests of France and England. Finally it is asserted that the economic interests which would materially benefit by a war, such as the manufacturing of arms and ammunition, had deliberately fostered the national antagonism in Europe. Much color was given to this charge by the revelations made in 1913, by Karl Liebknecht (q.v.), the Socialist leader in the German Reichstag. It was shown that the Krupps, the famous gun and ammunition makers, had regularly subsidized French newspapers to print inflammatory articles against Germany, in order to stimulate the hostility between these countries. It is difficult to estimate with any degree of accuracy just how much weight is to be assigned to these various economic factors as a cause of the war. That their influence was considerable there would seem to be little doubt.

II. OUTBREAK OF THE WAR

On June 28, 1914, the Archduke Francis Ferdinand (q.v.) and his morganatic wife the Duchess of Hohenburg were assassinated by Serbian sympathizers while on an official visit to the town of Serajevo, the capital of Bosnia. It was generally believed in Austria that the crime was instigated by Pan-Serbian agitators, who had maintained a persistent propaganda for the acquisition of the provinces of Bosnia and Herzegovina ever since they had been annexed by Austria in 1908. These provinces had once formed part of the old Serbian Empire, and about half of the population was related to the Serbs in race and speech. Despite the fact that Serbia had agreed in 1909 to recognize the annexation of these provinces by Austria as a *fait accompli*, the Pan-Serbian movement was allowed to continue in Serbia, unhampered by the government authorities.

In Austria this movement was resented for two reasons. In the first place, Serbia had emerged from the second Balkan War doubled in size, and any further strengthening of this country ran counter to Austria's commercial interests in the Balkans. As it was, Serbia stood in the way of Austria's realizing her ambition of reaching the Aegean Sea at Saloniki. In the second place, the Pan-Serbian movement was a positive danger to the integrity of the Austrian Empire. If successful, it might encourage other racial groups within the Empire to disrupt completely the Hapsburg dominions. Austria had therefore good reasons for regarding the Pan-Serbian propaganda with fear and resentment. Investigations carried on by the Austrian officials at Serajevo led to the conclusion that the assassination of the Archduke had been planned by the conspirators at Belgrade and that the pistols and bombs used had been smuggled into Bosnia from Serbia with the connivance of Serbian officials. Having established these alleged facts, the Austrian government felt justified in proceeding in the most summary manner to crush once and for all the Pan-Serbian movement. With this in view there was presented to Serbia, by Austria, on July 23, 1914, an ultimatum couched in the most vigorous language. Count Berchtold (q.v.) was the Austrian Foreign Minister.

The note began by recalling the declaration made by Serbia on the 31st of March, 1909,

wherein Serbia recognized the *fait accompli* regarding Bosnia and agreed to renounce any attitude of protest or opposition to the annexation of Bosnia by Austria. The Austrian note then went on to complain that Serbia had not lived up to this undertaking, and had made it necessary for Austria to take action to protect herself against the Pan-Serbian propaganda. Austria insisted that Serbia should make an official and public condemnation of this propaganda and express regret at its consequences.

The note then submitted ten specific demands and required an answer from Serbia by six o'clock on Saturday evening, July 25, within 48 hours of its presentation.

These demands required that Serbia should suppress every publication which excited hatred of the Dual Monarchy; that the Serbian government dissolve certain societies accused of fomenting the propaganda hostile to Austria; that teachers guilty of instigating hatred of Austria be dismissed and that objectionable matter in the textbooks be eliminated; that Serbia dismiss from her army and governmental employ all officers and officials found taking part in the propaganda; that Serbia accept the collaboration of agents of the Austro-Hungarian government in suppression of the subversive movement against Austria; that Austro-Hungarian representatives be allowed to take part in the investigation of persons in Serbia accused of complicity in the murder of the Archduke; that Serbia take action against two specified officials, who were accused of complicity in the crime at Serajevo; that Serbia take effective measures to stop the smuggling of arms and ammunition across her border; and finally that Serbia give explanation of the expressions of hostility toward Austria-Hungary on the part of certain high Serbian officials.

The publication of this note immediately aroused great apprehension in the chancelleries of the European Powers. It was clear that Europe was confronted with another serious crisis.

It is a striking fact that each of the Powers of the Triple Entente was confronted by serious internal difficulties at this most critical time. Great Britain was threatened by serious disturbances in Ireland resulting from the passage of the Home Rule Bill (see IRELAND); St. Petersburg was involved in a great strike; in France the Caillaux affair (see FRANCE) had affected seriously the prestige of the government and the Minister of War declared that the army was in a deplorable state of unpreparedness.

The first move of Sir Edward Grey (q.v.), the British Foreign Secretary, was to urge upon Austria-Hungary the necessity of extending the time limit of the ultimatum. In this he was strongly supported by M. Sazonov, the Russian Foreign Minister. Germany, however, was not inclined to bring pressure upon her ally in this matter and Austria flatly refused any extension of time.

Failing in this move, the British and Russian Ministers turned their efforts to persuading Serbia to accept, as far as possible, the demands made by Austria. In this they were largely successful.

The Serbian Reply. Serbia's reply to the Austrian ultimatum was handed to the Austrian Minister at Belgrade on July 25, only two minutes before the expiration of the time limit. The reply began by stating that the Serbian govern-

ment was not aware of any official action since 1909 protesting against the political status of Bosnia-Herzegovina, and that the only representation made by Austria, that concerning a school book, had been explained to the satisfaction of the Austrian government. To this the Austrian government replied in an official rejoinder that it was not sufficient to indicate that there had been no official action against Austria. It was the failure of Serbia to use energetic measures to suppress unofficial agitation directed against the territorial integrity of Austria of which complaint was made.

The Serbian reply further stated that the Serbian government did not consider that they could be held responsible for the opinions expressed by private individuals, such as articles appearing in the press and the peaceful proceedings of societies. Serbia agreed, however, to amend her constitution to permit the enactment of legislation to suppress such publications. Most of the other demands were agreed to by Serbia with slight verbal changes. There were two points, however, with which Serbia did not comply. In the first place, to the demand that Serbia accept the collaboration of agents of the Austrian government in the suppression of the subversive movement directed against the territorial integrity of the Dual Monarchy, Serbia replied that she did not understand exactly the meaning of the demand, but that she was ready to accept such collaboration as should conform to the principles of international law and criminal procedure. The Austrian rejoinder stated that it was not a question of international law but of the exercise of police powers which could be settled by agreement between the parties concerned. In the second place the demand made by Austria that Austrian officials be permitted to take part in the investigation relating to the judicial proceedings in Serbia against persons involved in the Serajevo crime, the Serbian government would not concede on the ground that such action would violate the Serbian constitution. The Austrian rejoinder accused the Serbian government of deliberately misrepresenting the Austrian demand, which contemplated simply a participation in the preliminary investigation to the judicial proceedings. Finally the Serbian government agreed, in case the Austrian government should find the reply unsatisfactory, to submit the disputed questions to The Hague Tribunal or the Great Powers for decision.

The representatives of the Entente Powers were satisfied that Serbia's reply was a substantial agreement to the Austrian demands. Austria, however, claimed to find the reply wholly unsatisfactory and in this view she was apparently supported by Germany.

From the time of the presentation of the Austrian ultimatum, it was recognized on all sides that the great danger was that any move on the part of Austria would precipitate a general European war. The delicate balance of interests in the Balkans could not be disturbed without involving serious consequences. Russia in particular felt that she was deeply interested in the fate of the small Slav nations in the Balkan Peninsula. The Russian Ambassador at Vienna stated on July 24 that "any action taken by Austria to humiliate Serbia could not leave Russia indifferent." (B.W.P. No. 7.) At Berlin, too, it was clearly recognized that Austria's action would probably involve Russia.

The German memorandum states that Germany was fully aware that "warlike moves on the part of Austria-Hungary against Serbia, would bring Russia into the question and might draw Germany into a war in accordance with her duty as Austria's ally." (G.W.B. p. 4.)*

Despite Austria's assurance that she had no intention of annexing Serbian territory or disturbing the balance of power in the Balkans, Russia felt that, apart from the acquisition of territory, the crushing of Serbia would reduce her to a vassal state of Austria, and that this would imperil the balance of power in the Balkans. In view of this situation the Russian Foreign Minister stated that Russia would mobilize against Austria on the day that the Austrian army crossed the Serbian frontier. (B.W.P. No. 72.)

This determined attitude of Russia made any efforts which the Powers might make to localize the struggle futile. The next question of vital interest was the attitude which Germany would take. How far was she prepared to support her ally Austria in her uncompromising position towards Serbia? In defining its position the German government declared "The attitude of the Imperial government in this question is clearly indicated. The agitation carried on by the Pan-Slavs in Austria-Hungary has for its goal the destruction of the Austro-Hungarian Monarchy, which carries with it the shattering or weakening of the Triple Alliance and, in consequence, the complete isolation of the German Empire. Our nearest interests, therefore, summon us to the support of Austria-Hungary." (G.W.B. exhibit 2.) And further "A morally weakened Austria under the pressure of Pan-slavism would be no longer an ally on whom we could count and in whom we could have confidence, such as we must have, in view of the increasingly menacing attitudes of our neighbors on the east and west." (G.W.B. memo. p. 5.) It is clear therefore that Germany felt that her interests as well as those of Austria were vitally affected. It was generally believed, and openly stated, that Germany knew the nature of the Austrian ultimatum to Serbia before it was sent and had urged Austria to precipitate a crisis by presenting demands which Serbia would not accept. This was categorically denied by the German authorities. (B.W.P. No. 25.) Nevertheless Germany thoroughly approved of the Austrian demands and insisted that the quarrel should be considered simply as an affair between Austria and Serbia.

Obviously it was of the utmost importance to prevent, or at least delay, the first hostile move by Austria against Serbia. On July 26, Sir E. Grey suggested a conference of the representatives of the four Powers, England, France, Germany, and Italy, for the purpose of discovering an issue which would prevent complications between Austria and Russia. (B.W.P. No. 36.) To this suggestion France and Italy agreed. Germany, however, declined to fall in with this plan. The German Foreign Minister stated that "a conference such as Sir E. Grey suggested would amount to a court of arbitration and could not, in his opinion, be called together except at the request of Austria and Russia" (B.W.P. No. 43); and furthermore that "he

did not think it [the conference] would be effective, because such a conference would in his opinion have had the appearance of an Areopagus consisting of two Powers of each group sitting in judgment upon the two remaining Powers." (B.W.P. No. 71; G.W.B. memo. p. 8.)

Direct negotiations between Russia and Austria were unsuccessful, Austria refusing to consider a modification of the terms of her ultimatum to Serbia. (B.W.P. No. 93; R.O.B. No. 45.) Further efforts on the part of England to have Germany propose some formula which would be acceptable proved unavailing (B.W.P. No. 111), and on July 28, 1914, Austria declared war on Serbia. This action on the part of Austria appears explicable on one of two grounds. Either she was convinced that Russia was bluffing and would back down as she did in 1908, or else that Austria was prepared deliberately to precipitate a European war.

Germany and Russia. The Russian government had very definitely declared that Russia could not remain indifferent to the fate of Serbia. It was generally believed in Russia that Austria's action was directed against her quite as much as against Serbia. (R.O.B. No. 75.) Consequently on July 29, 1914, Russia declared partial mobilization against Austria-Hungary. At the same time the Russian Foreign Minister stated that this action was in no way directed against Germany. (R.O.B. No. 49.) These military preparations stimulated the diplomats in their final efforts to find some solution which would prevent a European conflagration. Various formulas were suggested but none was acceptable. On July 29, Sir E. Grey urged that "the German government should suggest any method by which the influence of the four Powers could be used to prevent war between Austria and Russia. France agreed. Italy agreed. The whole idea of mediation or mediating influence was ready to be put in operation by any method that Germany thought possible, if only Germany would press the button in the interests of peace." (B.W.P. No. 84.) Germany did press the button to the extent of urging Austria to renew negotiations with Russia. At the same time Russia was requested to prepare a formula which would be satisfactory to her. M. Sazonov accordingly submitted the following suggestion: "If Austria, recognizing that her conflict with Serbia has assumed the character of a question of European interest, declares herself ready to eliminate from her ultimatum points which violate the principle of the sovereignty of Serbia, Russia engages to stop all military preparations." This formula was wholly unsatisfactory to Germany and Austria, and at the suggestion of Sir E. Grey the Russian formula was modified to read: "If Austria will agree to check the advance of her troops on Serbian territory; if, recognizing the fact that the dispute between Austria and Serbia has assumed a character of European interest, she will allow the Great Powers to look into the matter and determine whether Serbia could satisfy the Austro-Hungarian government without impairing her rights as a sovereign state or her independence, Russia will undertake to maintain her waiting attitude."

One final effort was made by England and Germany to prevent a break between Austria and Russia. Sir E. Grey, on July 31, said that if Germany would suggest any reasonable proposal which would preserve peace, and if France

* In referring to the official documents the following abbreviations are used: British White Paper, B.W.P.; German White Book, G.W.B.; Austrian Red Book, A.R.B.; Russian Orange Book, R.O.B.; French Yellow Book, F.Y.B.; Belgian Gray Book, B.G.B.; Italian Green Book, I.G.B.

and Russia rejected such a proposal, Great Britain would not support them, but on the other hand if no such proposal were made and France became involved, Great Britain would be drawn in. (B.W.P. No. 111.) Germany, on her part, brought pressure on Austria to agree to discuss with Russia the terms of the Austrian ultimatum, and at the last moment, on July 31, Austria agreed to do so. (A.R.B. Nos. 49-50.) This slim chance of preventing a break at the eleventh hour was nullified by the demand made by Germany that Russia should cease her military preparations and demobilize her army. At midnight on July 31, 1914, the German Ambassador delivered an ultimatum to Russia demanding that she demobilize her forces not only against Germany but also against Austria-Hungary. (R.O.B. No. 70.) As Russia returned no reply to this demand the German Ambassador was ordered on August 1, at 5 P.M., to notify the Russian government that Germany considered that a state of war existed between the two countries. (G.W.B. exhibit 26; R.O.B. No. 76.)

Germany and France. At the same time that Germany presented the ultimatum to Russia, a communication was sent to France informing her of Germany's action and asking what attitude France would take in the event of war between Germany and Russia. An answer was demanded within 18 hours. (F.Y.B. No. 116; G.W.B. exhibit 25.) To this demand the French Premier replied on August 1, that "France would take such action as her interests might require." (G.W.B. exhibit 27.) Despite this unsatisfactory answer the German Ambassador did not leave Paris until August 3. In the meantime charges and countercharges were made by the French and German authorities that warlike moves had been made on the frontier.

Great Britain and Germany. From the first it was evident that the question of England's attitude in the face of the great European crisis was of the most vital importance. In that most critical week following the presentation of the Austrian ultimatum, Sir E. Grey worked early and late to arrive at some peaceful solution of the difficulty. From the very beginning France and Russia had urged Great Britain to come out with a definite statement that if war was precipitated she would support them, pointing out that such a stand by Great Britain would deter Germany from entering the war. M. Sazonov, the Russian Foreign Minister, said "he did not believe that Germany really wanted war, but her attitude was decided by England's. If she took her stand firmly with France and Russia there would be no war." (B.W.P. No. 17.) The President of France, M. Poincaré (q.v.), went so far as to appeal directly to King George stating "I am profoundly convinced that at the present moment the more Great Britain, France, and Russia can give a deep impression that they are united in their diplomatic action, the more possible it will be to count upon the preservation of peace." Sir E. Grey did not accept their suggestions. It was his view that Great Britain could work most effectively for peace by playing the part of mediator. At the same time he made it clear to the German Ambassador that if Germany and France became involved "the issue might be so great that it would involve European interests and he did not wish him to be misled into thinking that Great Britain would stand aside." (B.W.P. No. 89.) Germany

fully appreciated the importance of keeping Great Britain neutral, if possible. With this end in view the German Chancellor proposed that if Great Britain would remain neutral Germany would guarantee that no territorial acquisitions would be made at the expense of France. He was unwilling, however, to make a similar undertaking in regard to the French colonies. (B.W.P. No. 85.) This suggestion was declined by Great Britain on the ground that France might be so crushed as to lose her position as a great power, without having territory taken from her. Furthermore that other contingencies might arise which would justify Great Britain's entrance into the war. (B.W.P. No. 101.) A further request from Germany that Sir E. Grey formulate conditions on which Great Britain would remain neutral was declined. He stated that "he could only say that they must keep their hands free." (B.W.P. No. 123.) The British government, therefore, up to the very last day of European peace refused either to bind herself to come to the aid of France and Russia or to remain neutral.

Question of Belgian Neutrality. The Congress of Vienna in 1815 turned over the Austrian Netherlands, or Belgium, to Holland in compensation for certain Dutch colonial possessions retained by Great Britain. This union was opposed by the Belgians and at the first favorable opportunity (1830) they revolted. France was anxious to annex the provinces but Great Britain, following her traditional policy, opposed their union with any great power. This opposition was due to the proximity of the Belgian coast to her shores and also because of the important commercial interests of Great Britain in these rich provinces, which might suffer if they passed into the hands of some great European power. Great Britain's interests would be best served by erecting Belgium into an independent state and by guaranteeing the permanence of this independent status by making the country perpetually neutral. Accordingly in 1831 the principal European Powers, Great Britain, France, Prussia, and Russia, joined in guaranteeing the independence and perpetual neutrality of Belgium. This treaty was replaced by treaties signed in 1839 after Holland had agreed to recognize Belgian independence. When in 1870, at the outbreak of the Franco-Prussian War, it seemed possible that one or both of the combatants might violate the neutrality of Belgium, a separate treaty was signed between Great Britain and each of the belligerents, by which Great Britain agreed that if either belligerent should violate Belgian neutrality the other could rely upon England as an ally in defense of the treaty of 1839.

When on July 31, 1914, the outbreak of a European war seemed unavoidable, Sir E. Grey telegraphed the British ambassadors at Paris and Berlin to request the French and German governments to state whether they were prepared to respect the neutrality of Belgium so long as no other power violated it. To this the French authorities returned an affirmative answer. The German Secretary of State, however, stated that it was doubtful if Germany could return any reply without disclosing a certain amount of her plan of campaign. On Aug. 2, 1914, the German Minister presented to the Belgian Foreign Minister an ultimatum which stated that Germany had "reliable information . . . of the intention of France to

march through Belgian territory," that it was "an imperative duty for the preservation of Germany to forestall this attack." Germany agreed to evacuate Belgian territory as soon as the war was over and to indemnify Belgium for all damages if she would maintain an attitude of "friendly neutrality." In case of refusal Germany stated that Belgium would be considered as an enemy and the question would be left "to a decision of arms." (B.G.B. No. 20.) To this demand the Belgian government returned a flat refusal and stated that they were "firmly resolved to repulse by every means within their power any attack upon their rights." (B.G.B. No. 22.) At the same time Belgium called upon Great Britain, France, and Russia, as signatories of the treaty of 1839, to carry out the guarantee of Belgian neutrality. In response to this request Sir E. Grey on Aug. 4, 1914, sent an ultimatum to Germany demanding a satisfactory reply to her request that Belgian neutrality be respected and requiring an answer by midnight of the same day. Upon Germany's refusal to give such a guarantee Great Britain declared war on Germany. While the violation of Belgian neutrality was the ostensible reason for Great Britain's declaration of war, she had, as a matter of fact, intervened in the war two days before the dispatch of her ultimatum to Germany. In a speech made in the House of Commons on Aug. 2, 1914, Sir E. Grey stated that he had on that day assured the French government that the British fleet would protect the northern coast of France from any attack by the German fleet. By this act Great Britain had tentatively intervened in the war, and the violation of Belgian neutrality by Germany changed this partial and tentative intervention into full participation in the war.

German authorities clearly appreciated that Germany's action in invading Belgium would arouse public sentiment in most neutral countries and strenuous efforts were made subsequently to justify their action. In a speech in the Reichstag on Aug. 4, 1914, the German Chancellor, Theobald von Bethmann-Hollweg (q.v.), said, "Gentlemen, we are now acting in self-defense. Necessity knows no law. Our troops have occupied Luxemburg and have possibly already entered on Belgian soil. Gentlemen, this is a breach of international law." But other grounds than that of bald necessity have been advanced by German apologists to justify their action. It has been claimed that Prussia, and not the German Empire, signed the treaty of 1839 and hence the latter was not bound by its provisions. To this it has been answered that the German Empire succeeded to the obligations of its component parts and that all treaties survived that were not formally denounced. It has also been stated that the treaty of 1839 was superseded by the treaties of 1870 which latter had lapsed. From the debates in the British Parliament at the time of the proposal of the treaties of 1870 there is no indication that the treaty of 1839 was to be superseded but rather to be strengthened. Germany furthermore claimed that certain secret documents which were discovered among the papers of the Belgian government at Brussels go to prove that Belgium had by its own acts relieved Germany of the obligation to respect her neutrality. These documents contain an account of certain conversations between the Chief of the Belgian General Staff and the British Mil-

tary Attaché at Brussels, relative to the sending of British military forces to Belgium in case of an invasion of the latter by Germany. The German authorities claim that this amounted to an Anglo-Belgian alliance against Germany. In answer to this charge King Albert (q.v.) of Belgium stated, according to an interview in the *New York World* (March 22, 1915), that the conversations referred to had been long known to the German authorities, having been communicated to the German Military Attaché at Brussels so as to avoid any semblance of entering into an unneutral agreement. Germany also complained that Belgian military preparations for the defense of her neutrality, instead of being impartially directed against the possibility of an attack from any of the Powers, were made entirely against Germany. To this it is answered that the fortress of Namur was directed against France as Liège was directed against Germany. Furthermore that if greater energy had been directed towards fortifying the German than the French frontier, this was but natural in view of the German activity in building military railways leading up to the Belgian frontier. Finally Germany declared that her invasion of Belgium was in response to violations of Belgian neutrality by France. But of this no satisfactory evidence has been produced. To the impartial observer, therefore, it would appear that German justification for the violation of Belgian neutrality must rest entirely on the ground of military necessity.

Italy's Position. At the outbreak of the European War, Italy found herself in a most trying position. To Austria and Germany she was bound by the defensive treaty of the Triple Alliance (q.v.). Her position as a member of this alliance had from the beginning been unnatural. Ever since Italy obtained national unity in 1870, there has been a strong movement to obtain the Italian-speaking provinces of Triest and Trentino, still held by Austria. This aspiration in Italy for what is called "Italia Irredenta," or unredeemed Italy, has been a source of constant friction between Italy and Austria.

The first indication of Italy's wavering in the support of her allies was when she threw her influence against Germany at the Algeiras Conference. Again in 1908 Italy was much irritated when Austria-Hungary annexed Bosnia-Herzegovina, thereby strengthening her position on the Adriatic Sea. But the most serious blow to the diplomatic group of the Triple Alliance was given by Italy in 1911 when she declared war on Turkey, a country which had come to be regarded as a member of the Triple Alliance group. Germany and Austria were forced to stand by and allow Italy to weaken the influence of the Triple Alliance by dismembering Turkey. All of these events indicated that Italy's attitude at the outbreak of a European war would be uncertain. Her position was made more precarious by her extensive coast line. Any war which involved Great Britain as an enemy would expose Italy to attack by the powerful British navy.

Apart, however, from questions of vital interest, Italy maintained that under the terms of the Triple Alliance she was not bound to come to the aid of Germany and Austria-Hungary, because, in her view, Austria-Hungary had been the aggressor and Italy's obligations under the treaty contemplated only a defensive war.

Accordingly on Aug. 1, 1914, Italy declared that she would remain neutral. Italy's declaration of neutrality did not, as the Italian Foreign Minister stated, "signify the relinquishment of Italian interests in the Balkans and in the Adriatic, but, on the contrary, the persuasion that such interests and aspirations shall be validly supported while the neutrality be maintained." (I.G.B. No. 2.)

Italy's next step was a most difficult one to determine. Should she remain neutral she could expect to gain little from either side, and she had to fear from her former allies, Germany and Austria, in case of their military success, a revengeful attitude. On the other hand to join the Entente allies was a difficult policy to pursue. In the first place it involved the moral question of turning against her former allies. In the second place the Russian and Serbian policy in the Balkans was not certain to be in agreement with Italy's ambition to control the Adriatic. Other considerations also caused Italy to hesitate before casting in her lot with the Entente allies. Such were the unfavorable financial condition of the country, the pro-German sympathies of the royal family, and the opposition of ex-Premier Giolitti (q.v.), who, with a strong personal following in the Italian Parliament, maintained that Italy should not enter the war.

For 10 months the contest between the neutralists and the interventionists went on in Italy. Great efforts were made by Germany and Austria, especially through Prince von Bülow and his Italian wife, to influence public opinion in Italy. It was clear, however, that there was a steady drift of popular sentiment in favor of the Entente. This movement was strengthened, too, by the death of the Marquis di San Giuliano (q.v.), Minister of Foreign Affairs, in October, 1914, who was popularly regarded as a strong sympathizer with Germany and Austria-Hungary. Baron Sidney Sonnino (q.v.), who succeeded him, is regarded as one of the most astute Italian statesmen since Cavour. In the meantime the Italian government had entered upon a series of communications with Austria-Hungary looking to a satisfaction of Italian aspirations and interests in the Balkans. The Italian Foreign Minister began by setting forth that, under Article VII of the Triple Alliance, Italy was entitled to compensations, in the event of any occupation of Serbian territory, even temporarily, by Austria-Hungary. The Austrian officials were not inclined to admit, at first, that Italy had any valid claim to compensations under the terms of the treaty of the alliances.

From this stand, however, Austria soon receded, probably under pressure from Germany, and conceded the principle that Italy was entitled to compensations. There followed several months of protracted negotiations. Italy demanded as the minimum that she would accept in the way of compensations "the district of the Trentino, a new district on the Isonzo, the special treatment of Trieste, the cession of some islands of the Curzolari Archipelago, a declaration of Austria's disinterestedness in Albania, and the recognition of our possession of Valona and Dodecanesia." To these demands Austria was willing to concede only a portion of the Trentino and was unwilling to make any cession before the end of the war.

These fruitless negotiations culminated in the declaration by Italy, on May 4, that she no

longer considered herself bound by the provisions of the Triple Alliance. After three weeks of hesitation during which public excitement in Italy reached a high pitch, Italy finally declared war on Austria, May 24, 1915. Just before the final break, according to a statement made by the German Chancellor, Austria-Hungary made a last attempt to purchase Italy's neutrality offering (1) the Italian part of the Tirol; (2) the western bank of the Isonzo "in so far as the population is purely Italian," and the town of Gradisca; (3) sovereignty over Avlona and a free hand in Albania; (4) special treatment of Italian nationals in Austria and amnesty for political prisoners who were natives in the ceded provinces; (5) Trieste to be made an Imperial free city, and to have an Italian University. Furthermore, it was stated that Austria would make these concessions at once and not wait for the conclusion of the war.

Japan's Position. Japan's entrance into the European War was due to her treaty of alliance with Great Britain. After the Chinese-Japanese War Japan was deprived of the fruits of her victory, when Port Arthur and the Liaotung peninsula had to be returned to China at the demand of Russia, France, and Germany. Smarting under this humiliation, Japan turned to Great Britain and in 1902 negotiated a treaty of alliance, according to the terms of which Japan agreed to come to the defense of Great Britain's Eastern possessions if she were attacked by more than one Power. Great Britain on the other hand insured Japan against a European coalition such as had intervened at the conclusion of the Chinese-Japanese War.

At the outbreak of the European War Japan saw her opportunity to revenge her humiliation at the close of the Chinese War. Actuated also by a determination to carry out her obligations to Great Britain, the Japanese representative in Berlin presented an ultimatum on Aug. 19, 1914, "advising" Germany to withdraw all warships from Asiatic waters and turn over to Japan the territory of Kiaochow before Sept. 15, 1914, which territory Japan promised eventually to restore to China. This port and surrounding territory had been obtained by Germany from China in 1897 as a compensation for the murder of two German missionaries. The Germans had fortified the harbor strongly and had made it a fine naval base. As Germany refused to reply to the Japanese demand, Japan declared war on Aug. 23, 1914. The Japanese Foreign Minister defended this action on the ground that Japan was bound by treaty obligations to come to the aid of her ally, Great Britain, and that Germany's position at Kiaochow gravely threatened the maintenance of peace in the Far East and the independence and integrity of China which Japan had bound herself to maintain.

Turkey. Germanic influence had for a number of years prior to the outbreak of the war been predominant in Turkey. It was natural, therefore, that Turkish sympathies would be with the Teutonic allies. But Turkey hesitated, at first, to make common cause with Germany because of her exposed position and the fact that her recent experiences in the Balkan wars had left her exhausted. Events, however, rapidly forced Turkey to abandon her attitude of quasi-neutrality. Shortly after the outbreak of the war two German warships, the *Goeben* and the *Breslau*, in order to escape capture by the British and French fleets, sought refuge in the Darda-

nelles. The demand of England and France that these ships should either be forced to put to sea or be interned was answered by Turkey stating that she had purchased the ships from Germany. Turkey also refused to remove the German crews of the two vessels. The Triple Entente also resented the action of Turkey in closing the Dardanelles and in serving notice that the "capitulations," under the terms of which the national subjects of various Powers were given special privileges in Turkey, would be revoked on Oct. 1, 1914.

When on October 29 the former German warship, the *Breslau*, bombarded the Russian Black Sea port of Theodosia, Russia accepted this as a declaration of war and the following day the Russian Ambassador at Constantinople demanded his passports. This action of Russia was followed by France and England declaring war on Turkey, Nov. 5, 1914. Turkey's entrance into the war aroused the hope in Germany and some fear in Great Britain and France that a Holy War would be proclaimed by the Sultan which would arouse the Moslem populations in India, Egypt, and Morocco. The Sultan's efforts in this direction proved unavailing, and no serious uprising occurred among the Mohammedan subjects of Great Britain and France.

The Balkan States. The opening of the European War found the Balkan Peninsula in the political shape given to it by the Treaty of Bucharest, Aug. 10, 1913, which closed the second Balkan War (q.v.). This treaty, which represented the latest effort on the part of the European Powers to adjust the Balkan situation, proved unsatisfactory to nearly all of the parties concerned. Turkey did not accept with good grace the loss of nearly all of her European territory. Bulgaria was bitter towards her former allies, Greece, Serbia, and Montenegro, who she felt had treacherously combined to deprive her of her just rewards. Serbia resented the action of Austria, Italy, and Germany in depriving her of an outlet to the Adriatic. Montenegro was disappointed in being forced to surrender Scutari. Finally Albania, the new state created by the Powers to thwart Serbia's ambition to reach the Adriatic, was in a state of ill-disguised anarchy under the shadowy control of Prince William of Wied. See WILLIAM OF WIED.

As has been seen, Serbia had been involved in the war from the beginning and Montenegro soon threw in her lot with her neighbor. The attitude of the other Balkan states was a matter of great concern to the diplomats of the allied groups. During the months succeeding the outbreak of the war, a diplomatic struggle ensued in these states, with the aim of winning their support to one or the other side.

In this struggle the diplomats of the Teutonic Powers had certain distinct advantages. In the first place the monarchs (Constantine I, Ferdinand I, Charles I, q.v.) of the three states, Greece, Bulgaria, and Rumania, were related by blood and marriage with the Teutonic royal families. Moreover, as the British Prime Minister (H. H. Asquith, q.v.) indicated in a speech in the House of Commons, Germany had a distinct advantage in that she could conduct her negotiations with a singleness of purpose, as her interests and those of Austria-Hungary were identical. On the other hand, the Entente diplomats had to consider the interests, not always identical, of three and, later, four Powers. Finally the Entente allies were handicapped by

the fact that Russian ambitions in the Balkans conflicted with the national aspirations of the smaller Balkan states; that Italy's territorial ambitions in Albania ran counter to the legitimate aspirations of Serbia, and that Greece resented the attempt of Italy to gain a foothold on the coast of Asia Minor, which was racially and historically Greek.

In view of these conditions it is not surprising that the efforts of the Entente diplomats, even had they been conducted more skillfully than they appear to have been, should have failed.

Bulgaria.—The second Balkan War left, as has been noted, a heritage of bitterness and hatred among the former Balkan allies. The Bulgars, smarting under the humiliation of the Treaty of Bucharest, welcomed the opportunity to revenge themselves upon their former allies. Completely disillusioned by their experiences of the past few years, they put aside all feeling of generosity or gratitude and frankly adopted a programme of "real politik." To the diplomats of the Entente and the Teutonic allies the Bulgarian authorities made it clear that all question of sentiment, so far as Bulgaria was concerned, was to be disregarded and that they were prepared to sell out to the highest bidder. Great Britain and France brought pressure to bear on Rumania, Serbia, and Greece to satisfy, in part, the territorial demands of Bulgaria. The Teutonic Powers made counter proposals promising Bulgaria a large part of Serbian territory in case of the success of the Central Powers. For more than a year Bulgaria hesitated, apparently weighing the relative advantages of the rival proposals. In the meantime the Bulgarian army was mobilized, in order to be prepared when the final decision was reached. It became increasingly evident as the months passed that the attitude of King Ferdinand and the military leaders was favorable to the Teutonic allies. Matters were brought to a head when, on Oct. 3, 1915, Russia notified Bulgaria that if she did not, within 24 hours, break with the Teutonic Powers, the Russian Minister would withdraw from Sofia. A similar demand was made by France, while Great Britain stated that if Bulgaria precipitated hostilities in the Balkans she would break off relations with her. On Oct. 8, 1915, Bulgaria replied, rejecting these demands and throwing her support to the Teutonic Powers. In a manifesto issued by M. Radoslavoff,* the Bulgarian Premier, there was set forth the reasons for Bulgaria's decision. He stated frankly that considerations of self-interest had dictated the step. He pointed out that Bulgaria's chief economic interests were with the Teutonic Powers and Turkey, and that these interests would be seriously menaced if Constantinople fell into the hands of Russia. In reviewing the proposals of concessions made to Bulgaria by the opposing groups, he held that the Teutonic proposals were more advantageous to Bulgaria. And finally he had reached the conclusion that the progress of the war indicated the probable success of the Central Powers, and it was vital to the interests of Bulgaria to be on the side of the victors.

Greece.—Conflicting influences and interests

* Vassil Radoslavoff, born in Lowatseh; studied law at Heidelberg; at various times served as Minister of Justice, Minister of the Interior, and Premier; did much as Premier in 1913 to bring Balkan War to an end; became Premier and Minister of Foreign Affairs (October, 1915) during European War; made important declarations of Bulgarian policy; shot at twice (March, 1916).

complicated the situation in Greece at the outbreak of the war. On the one hand, the royal family was closely related to the Hohenzollerns, the Greek Queen Sophia being a sister of the German Emperor, William II (q.v.). On the other hand, the Premier Venizelos (q.v.) felt that the best interests of Greece would be served by joining the Entente allies. Popular sympathy in the country appeared to be with the Entente group, and especially with France. In addition, Greece was bound by a treaty of alliance with Serbia which obligated her to come to the aid of Serbia if she were attacked by Bulgaria. During the first months of the war the diplomats of France and Great Britain directed their efforts to winning all of the Balkan states to the support of the Entente. With this end in view both Greece and Serbia were urged to make territorial concessions to Bulgaria. These efforts were seconded by M. Venizelos, but the Greek King flatly opposed any territorial concessions and maintained that the best interests of Greece would be served by the observance of strict neutrality. The break between the King and his chief Minister led to the resignation of the latter in March, 1915. His return to office shortly after as a result of popular approval expressed in the elections to the new Chamber was hailed as a victory for the Entente, and it was generally expected that Greece would soon enter the war. The situation became acute when, in September, 1915, Bulgaria mobilized her army and Greece did likewise. Bulgaria's entrance into the war on the side of the Teutonic Powers raised the question of Greece's obligation under the treaty of alliance with Serbia. M. Venizelos maintained that Greece was bound to come to Serbia's aid, but the King once more interposed his objections, holding that the treaty contemplated only a local Balkan war and not one in which the Great Powers were involved. Again M. Venizelos resigned. In the meantime arrangements had been made by the Greek Premier with the Entente allies for the landing of French and English troops at the Greek port of Saloniki, which troops were to be used to aid Serbia. This use of a Greek port was a clear violation of Greek neutrality and the Greek government entered a formal protest. It was understood on all sides that this protest was purely formal, and the landing of troops continued. The resignation of M. Venizelos aroused some apprehension in France and England and pressure was brought to bear upon the new Premier, M. Zaimis (q.v.), to define his position. He stated that the attitude of Greece would be "neutrality, with the character of sincerest benevolence towards the Entente Powers." King Constantine, however, vigorously protested against the violation of Greek territory by Great Britain and France. He maintained that it was the sheerest hypocrisy for these countries to protest against the violation of Belgian neutrality by the Germans, while they themselves were violating Greek neutrality. He was strongly supported in these views by Stephanos Skouloudis, who succeeded Zaimis as Premier and who also took the portfolio of Foreign Affairs.

The period of the premiership of Skouloudis was very stormy. The Allies seemed to fear that their Saloniki expedition was threatened from the rear by the Greek army. This fear of an attack compelled General Sarrail to keep a strong force on the Macedonian front. In order to remove this threat the Allies from time to time

made demands on the Greek government which weakened the latter's military position. The Allies desired the use of the Peloponnesian railway to transport the regenerated Serbian army from Corfu to Saloniki. This was refused on the ground that it would be a violation of neutrality. After some hesitation the British Foreign Office announced that the troops would be transported by water.

This demand was only a preliminary to those which were to follow. In June, 1916, the Bulgarians crossed the Macedonian frontier and seized several Greek forts. When war was not immediately declared on Bulgaria, the Allied Powers demanded that the Greek army be demobilized. To enforce their demands, they blockaded the Greek ports and seized vessels and supplies in the harbors. Martial law was declared in Saloniki and the Greek military commander was superseded by a Frenchman. The Greek government sent identical notes of protest against interference with her trade by the Entente Powers to the United States and to all the South American governments. Nevertheless the result of the blockade was the demobilization of the 12 senior classes on June 9th.

As soon as order was restored a new set of demands was made on the Greek government. Before they were officially received, however, the Skouloudis government resigned. Former Premier Alexander Zaimis was again called upon to head the cabinet. The first act of his government was to accept unconditionally the demands of the Allies, which included briefly, (1) demobilization of the rest of the Greek army, (2) replacing of the Skouloudis cabinet with a business cabinet favorable to the Allies, (3) dissolution of the chamber and the holding of new elections, and, (4) replacement of certain police functionaries who had permitted insults against the Allied legations. Upon the acceptance of these demands the Allied blockade was withdrawn.

During this period of national unrest there was gradually springing up a strong anti-German party. The seizure of the garrison at Kavala by the Bulgarians, the abandonment of the Macedonian forts without a struggle and the entrance of Rumania into the war, brought the move to a head. A Committee of National Defense was established by those who were opposed to the supine attitude of the Greek government. It set up a provisional form of government for Macedonia and demanded that the Bulgarians be driven out. In order to aid this movement to succeed the Allies took an active part in it. They seized enemy merchantmen in the Piræus, the port of Athens. They also demanded and received all Greek ports and the use of the telegraph system. On account of inability to handle the situation the Zaimis ministry resigned.

The pro-Ally movement reached its height when a formidable revolution broke out in Crete during the third week in September. Venizelos immediately left Athens with a number of supporters for the seat of the revolution. One of his chief followers was Admiral Coudouriotis, whose desertion of the King left the latter in a very serious predicament. A proclamation establishing a provisional government was issued by Venizelos and Admiral Coudouriotis, and within a very short time Macedonia and all of the Greek islands were under their control. The provisional government declared war on Germany and Bulgaria on Nov. 25, 1916.

The Allies heartily approved the new Veni-

zelos government and proceeded to make further demands on the new Greek government, headed by Spyridon Lambros. The new demands included the turning over to the Allies of the Greek navy, certain strategical railways, forts, mails, telegraphs, police service, naval material, and the Piræus. They further demanded that any Greek who so desired be permitted to join the new government. All these demands were ultimately acceded to as a result of necessity.

Apparently still fearing an attack in their rear, the Allies demanded that all the arms and munitions belonging to the Greek army and navy be turned over to them. The Greek government was given until Dec. 1, 1916, to grant this last request. King Constantine refused to agree, marines were landed from the Allied fleet, and a scene similar to the days of the French Revolution occurred in Athens. True to his promise, Vice Admiral du Fournet fired upon royalist troops, when the time of his ultimatum expired. Thereupon a regular civil war broke out in Athens. Royalist troops fired upon Venizelists and vice versa. As a result of a truce King Constantine agreed to surrender all the mountain guns of the Greek army. When this was accomplished all the Allied marines were withdrawn to the fleet with the exception of a small guard.

The Entente nations continued to exert a political and economic pressure upon the Greek government. King Constantine adopted a passive attitude of submission to the demands of the Allies and determined to rely on the ultimate recognition by the world that his treatment had been unjust. The long conflict between King Constantine and the Entente came to an end on June 12, 1917, when the King abdicated in favor of his second son Alexander. This step was taken at the dictation of the Allies, who decided, after investigation, that the King and his elder son George were strongly pro-German. Zaimis, the prime minister, resigned and was succeeded by Venizelos, the staunch friend of the Entente. One of the first acts of the new ministry was to declare war on Bulgaria and Germany (July 2). Allied control was withdrawn with the exception of that over telegraphs and press censorship. Immediate steps were taken to actively join the Entente army around Saloniki. This removed the continual threat of an attack by Greek forces in the rear of General Sarrail's army. See *South-eastern Theatre*.

Rumania.—Somewhat the same division of sentiment obtained in Rumania as in Greece at the outbreak of the European War. The King, Charles I, was a member of the Hohenzollern family, and it was rumored that there was a secret treaty between Rumania, Germany, and Austria-Hungary. The mass of the Rumanian population is composed of illiterate peasants, but among the educated classes there was a strong pro-French and especially pro-Italian sentiment. The Rumanians claim descent from Roman colonists; and there has always been a strong sentimental attachment to Italy among the Rumanians. Apart from conflicting sentimental influences, the question of the wisest policy for Rumania to pursue to advance her material interests was not easy to determine. On the one hand a large Rumanian population was included in the Austrian dominions in Transylvania, while on the other hand the Russian province of Bessarabia was equally Rumanian

in nationality and more valuable economically than Transylvania.

At the head of the Rumanian ministry was John Bratianu, one of the shrewdest statesmen in the Balkans. He advocated a policy of waiting, with the intention of entering the war at the proper time when the greatest reward could be obtained by the least fighting. The death of King Charles in October, 1914, and the entrance of Italy into the war, were expected to influence Rumania to join forces with the Entente allies. But the failure of the Russian campaign in Galicia and Bulgaria's alliance with the Teutonic Powers caused Rumania to continue her policy of watchful waiting.

She continued this policy until April 28, 1916, when the Rumanian minister at Vienna presented a note to the Austro-Hungarian Foreign Minister which said that Rumania considered herself at war with Austria-Hungary since nine o'clock the previous evening. She maintained that her treaties with the Central Powers had been continually broken since the war began and that Rumanians in Austria-Hungary were being persecuted. She intervened to prevent these persecutions, to shorten the war if possible, and to realize her national ideal. She thought an alliance with the Entente allies would best enable her to accomplish the last purpose.

Portugal. Portugal was bound by a treaty of alliance with Great Britain, and at the outbreak of the European War Portugal stated that she was prepared to carry out her treaty obligations whenever Great Britain desired her to do so. However, Portugal did not enter the war until more than a year after the beginning of hostilities, although there were clashes between Portuguese and German troops in Africa. On Feb. 24, 1916, at the request of Great Britain, Portugal seized a number of German and Austrian ships lying in Portuguese harbors. On March 8, 1916, Germany declared war on Portugal, stating that the seizure of German vessels was done at the dictation of Great Britain, and could be regarded in no other light than as a hostile move against Germany.

For purposes of convenience the following dates of the declarations of war are given.

Austria against Serbia	July 28, 1914
Germany against Russia	Aug. 1, 1914
Germany against France	Aug. 3, 1914
Great Britain against Germany	Aug. 4, 1914
Austria against Russia	Aug. 6, 1914
Montenegro against Austria	Aug. 8, 1914
Serbia against Germany	Aug. 9, 1914
France against Austria	Aug. 10, 1914
Great Britain against Austria	Aug. 12, 1914
Montenegro against Germany	Aug. 12, 1914
Japan against Germany	Aug. 23, 1914
Austria against Japan	Aug. 25, 1914
Austria against Belgium	Aug. 28, 1914
Russia against Turkey	Oct. 30, 1914
Great Britain against Turkey	Nov. 5, 1914
France against Turkey	Nov. 5, 1914
Italy against Austria	May 24, 1915
Italy against Turkey	Aug. 22, 1915
Great Britain against Bulgaria	Oct. 15, 1915
Serbia against Bulgaria	Oct. 16, 1915
France against Bulgaria	Oct. 16, 1915
Italy against Bulgaria	Oct. 19, 1915
Russia against Bulgaria	Oct. 19, 1915
Germany against Portugal	Mar. 8, 1916
Rumania against Austria-Hungary	April 28, 1916
Italy against Germany	Aug. 28, 1916
Turkey against Roumania	Aug. 29, 1916
United States against Germany	April 6, 1917
Cuba and Panama against Germany	April 7, 1917
Greece against Bulgaria and Germany	July 2, 1917
Siam against Central Powers	July 21, 1917
Liberia against Germany	Aug. 4, 1917
China against Central Powers	Aug. 14, 1917
Brazil against Germany	Oct. 26, 1917
United States against Austria-Hungary	Dec. 7, 1917

III. MILITARY OPERATIONS

The military operations of the great war, in which the Central Powers were by turns on the offensive and on the defensive, hinge on the plan of the German general staff according to which Austria, with a small German force, was to hold Russia in check, while Germany crushed France, both Central Powers uniting for the subsequent Russian campaign.

The strategy of the war from this viewpoint falls easily under the following main divisions: I, Introduction and discussion of mobilization; II, Western theatre, or campaign against France; III, Eastern theatre, or campaigns against Russia; IV, Southern theatre, or campaigns against Serbia (involving Bulgaria's entry into the war) and Italian campaign; V, Southeastern theatre, or Turkish campaigns, including Suez, Gallipoli, and Caucasus. In no theatre of the war was the strategy unconnected with events taking place or about to take place on other fronts.

I. Introduction. The war that broke out in 1914 involved three continents and the seven seas. Not only its combatants, but the killed and wounded, were to be numbered by millions. Every known resource of mechanical ingenuity was drawn upon, and old and forgotten methods of warfare were brought into play side by side with the most powerful modern artillery, while aeronautics for the first time had occasion to show its worth. (See section *Aerial Operations*.) The edifice of international law, of the conventions of warfare, so painfully built up after centuries of struggle, was toppled over as a thing of no account. With these considerations before us we must remark that in the space here available nothing but a statement of the principal facts can be attempted. But even so, the nature of the struggle on one front, the western, calls for a word or two. When both sides simultaneously reached the sea there began a siege over the whole front that gave the struggle in this theatre a character unique in military history. At certain places in the "line" 32 parallel lines of German trenches were discovered by reconnaissance. The trench systems of this front were estimated, after including communication trenches, to be 25,000 miles long. Frontal attack became a necessity, since flanks there were none, and yet these attacks all proved failures (Feb. 1, 1917), for the experience gained under the new conditions had not as yet led to such a disposition of forces and resources as to carry them through to a decision. The most desperate efforts were made, first by one and then by the other side, to raise the siege, so to say, by a concentration at some selected point, and thus break through and end a situation that only a few years ago would have been deemed intolerable.

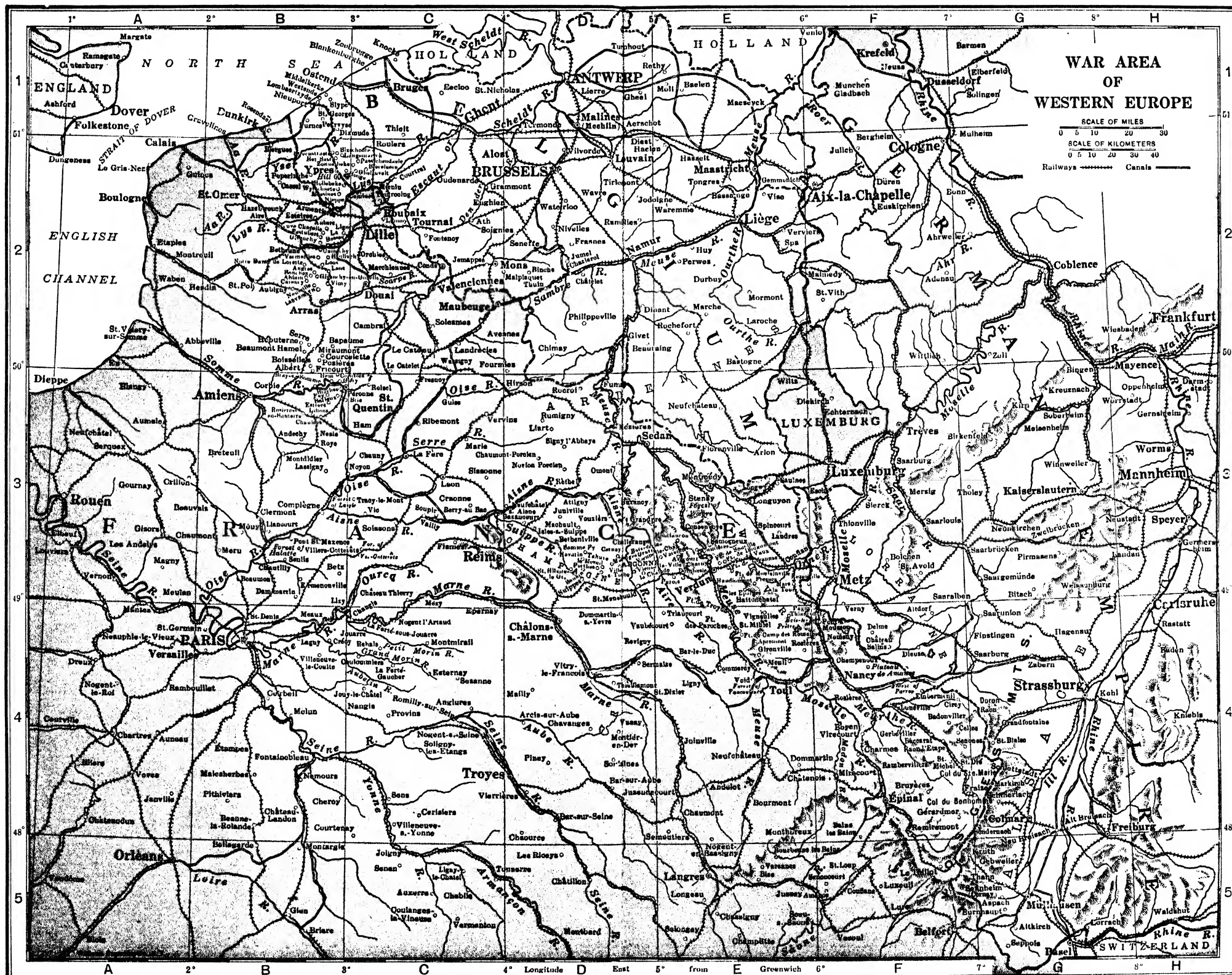
On the other fronts the phenomena of what may well now be called old-fashioned warfare were more or less reproduced, but even in their case a marked tendency to approximate to the conditions in France manifested itself—indeed may be said to have established itself on a part of the Russian lines and to a certain extent on the Italian. A marked feature of this war was the so-called mobilization of industries. So great was the draft made on the industrial resources of the countries involved that the struggle, other conditions equal, may be said to have resolved itself into a competition by each side to outstrip the other in supplies and munitions.

Mobilization and Concentration. When it became evident that the general European situation was becoming more and more serious, covering troops (*troupes de couverture*) were sent by the French government to the eastern frontier. These troops, five corps in all, or 200,000 men, with cavalry, began their movement on July 31 at 9 P.M., and had completed it on August 3 at noon. They were not to cross a zone 8 kilometers wide along the frontier, in order to prevent any clash with the Germans, so long as war was undeclared. On the German side the Emperor, on July 31, decreed the *Kriegsgefahrzustand*, or a sort of state of martial law, under which certain military measures could be adopted on the frontier, and the telegraph and railway services taken over by the military authorities.

Mobilization proper, however, began in both Germany and in France on August 2, in France at midnight. It was asserted that in Germany the operation was set afoot well before the formal date given above. In both countries it was carried on with the precision that the whole world had learned to expect of Germany, but of which, as regards France, it was somewhat doubtful. The purpose of mobilization, it may be recalled here, is to pass from peace to war footing. (See *MOBILIZATION*.) Each man liable to service reports on a given date at a specified point, draws his arms, uniform, and equipment, and joins a designated organization. Companies, battalions, regiments, etc., are thus brought up to war strength; transport material is requisitioned and train service prepared. The French mobilization, in two periods of ten and six days respectively, closed on August 18; the German, according to the French, on the 16th. German authorities, however, give the closing date as the 20th. Mobilization was followed by concentration.

The French armies began their concentration in the east of France from Belfort to the Belgian frontier, thus respecting the neutrality of Belgium and of Luxemburg. By this course the French, incidentally, gave the Germans choice of ground and freedom of manoeuvre. It should be recollected, however, that the exact intentions of the German general staff were unknown; they might attack either on the right or the left bank of the Meuse, or attempt a demonstration by the Oise, or even risk a break from Nancy on to Verdun. Further, the possibility of the offensive had to be kept in view, and the offensive, for the French, was possible only in Alsace and Lorraine. In other words, the concentration of the French was both offensive and defensive; while guarding the approaches on the east, they would be ready to face in any direction. As a matter of fact, the plan of concentration could not be fully carried out; it had to be modified because of the German advance through Belgium. Hence, in general terms, the French armies were stretched out from Belfort north and then northwest towards the Sambre, to join hands, if possible, with the English and Belgians. Certain corps even pushed their way into Belgium itself.

The German problem of concentration was simpler, if, as there is reason to believe, their intention from the first was to smash their way through Belgium. They contented themselves with merely observing the strong eastern (French) frontier, and disposed their other armies northward through Trèves, etc., to Ailla-Chapelle, in position to inaugurate and carry through a vast sweeping movement through Bel-



gium. They crossed the frontier of this country without waiting for either mobilization or concentration, using for this purpose troops kept immediately available near the frontier.

On the periods of mobilization and concentration of the other combatants it is not necessary to dwell. In Austria-Hungary the operation was merely a repetition of the German process, and, like that, carried out with promptness and accuracy. Russia was expected to be slow, but on the contrary was so energetic as to suggest a belief that she began before the formal declaration of war. England had no army to mobilize, but she prepared her "expeditionary force," crossed it over to the Continent, and got into position opposite the German right in time to offer a resistance that was invaluable to the Allied cause. See UNITED KINGDOM, *History*.

II. Western Theatre. The German armies, by a surprise thrust through Belgium in August, 1914, sought to paralyze the French army. This operation failed at the Marne (September).

Trench warfare resulted in the West, and from the North Sea to the Swiss border the line remained substantially unchanged to July, 1916, the battle of Verdun and the joint Allied offensive (July, 1916) forming the high-water marks of this fighting.

The detailed account of military operations on this front has six main steps: (1) The fortunes of the Belgian army up to its escape from Antwerp and safe retreat to the Yser Canal; (2) The relative dispositions of the rival armies of the French and German high commands up to and including the battle of the Marne; (3) The race to the seacoast which resulted in the establishment of the intrenched lines from Dixmude to Belfort; (4) The attempts of either side to break the intrenched line, including the battles of Ypres, Lille, Lens, and the Champagne drive inaugurated by Joffre to aid the hardly pressed Russians; (5) The battle for Verdun, in which the Germans sought a decision hoping not so much to shatter the French line as to shatter the morale of the French people and make a breach in Allied solidarity; (6) The Allied offensive in Picardy, in conjunction with the Russian and Italian activities in the East and South. It seems clear that Germany's plan of action was first to crush France and then to fall upon Russia. What was the shortest road to France? The frontier was heavily fortified; but even otherwise it would have left too narrow a front for the overwhelming armies which Germany intended to set in the field. Hence the shortest road lay through Luxemburg and Belgium. Of natural obstacles there were none; the three fortresses, Liège, Namur, and Maubeuge, were not in supporting relation to one another, the Belgian frontier was only 120 miles from Paris, and the way lay through the easy valleys of the Oise and of the Meuse.

Accordingly the Germans, violating the neutrality of Luxemburg and Belgium, undertook a vast sweeping movement, with its pivot at Mont Donon and its marching flank flung beyond the Sambre and the Oise. The French, on the other hand, respecting the neutrality of the countries just mentioned, had planned to attack the Franco-German frontier directly, under the following distribution of armies: first army (Dubail)* from the Swiss frontier to Donon; second

(de Castelnau)† from Donon towards Metz; third (Ruffey) in the Woëvre, facing the Metz-Thionville frontier region; fourth and fifth (Langle de Cary and Lanrezac) on the Belgian frontier.

Germany placed in line the following armies: first (Von Kluck) the marching flank; second (Von Bülow); third (Von Hausen); fourth (Duke of Württemberg); fifth (Crown Prince of Prussia); sixth (Rupprecht, Crown Prince of Bavaria); seventh (Von Heeringen); eighth (Von Deimling), to remain on the defensive in Alsace. What may be counted as a ninth army, under Von Emmich, made up of elements in immediate readiness, was to act as advance guard to the right wing, and carry Liège, on the expiration of the ultimatum addressed to the Belgian government.

As has been implied, Belgium declined to agree to the demand made by Germany to allow German troops to cross Belgian territory to the French frontier. August 3 and 4, all doubt as to German intentions having been removed, the Belgian authorities ordered bridges destroyed on all probable lines of advance, and the Belgian forces to move forward as follows: the first division from Ghent to Tirlemont; the second, Antwerp to Louvain; the fifth, Mons to Perwez; the sixth, Brussels to Wavre. The fourth was to remain at Namur, and the third in its position, Hasselt-Liège-Verviers. These movements were covered by the cavalry division (Waremmé), by a mixed brigade at Tongres, and by another at Huy. The strength of this army was about 117,000 men, increased later by 18,500 volunteers, with the King in command. It was, if opposed by superior numbers, to hold good defensive positions barring the enemy's advance, and to await in these positions the arrival of troops from the British and French armies. But if this junction were impossible, then the Belgian army was not to run the risk of severe loss, but was to guard against being enveloped, and act so as to secure its communications, for the purpose ultimately of joining hands with the Allies. Opposed by equal numbers, it was to attack, if conditions were favorable. In any case, Liège, Namur, and Antwerp were to be defended.

Invasion of Belgium.—On August 4 two cavalry divisions crossed the frontier, advanced

later attended the École de Guerre; general of brigade (1904); at Saint-Cyr was adjunct professor of geography (1874-76) and of military art and history (1880-85) and then commandant; wrote on his specialties; Commander of the Legion of Honor and possessor of various decorations; Military Governor of Paris during European War.

† Edouard de Curières de Castelnau, born in 1851; served in Franco-Prussian War; colonel attached to general staff (1896); served in Cochinchina and Algeria; commander of "Iron Division" at Nancy (1899); early in European War commanded Second Army of Lorraine and came to be known as the "savior of Nancy"; after battle of the Marne took command of the Army of the Somme; chief of the general staff (December, 1915); went to Greece and helped plan defenses of Saloniki.

‡ Albrecht, Duke of Württemberg, born (1865) in Vienna, son of Duke Philip of Württemberg and heir presumptive to the throne of the Kingdom; married (1893) the Archduchess Margareta Sophia of Austria; held commands in regiments of Uhlans, Grenadiers, Dragoons, cavalry, and infantry, rising to be general in command of the Thirteenth Army Corps; in command of German forces in Belgium (October, 1914) after its invasion and temporarily took over command of Crown Prince's army (February, 1916), received Order Pour le Mérite from the Kaiser.

§ Rupprecht, Crown Prince of Bavaria, born (1869) in Munich, eldest son of Ludwig (Louis) III, who became King in 1913; married the Duchess Marie Gabriele of Bavaria (1900); had a university education and military training in the Kriegsakademie; traveled extensively in India, Japan, China, etc. (1902-03); general, commanding the First Army Corps (1906); led Bavarian army in European War and received from the Kaiser the Order Pour le Mérite.

* Augustin Yvon Edmond Dubail, born (1851) at Belfort; educated at Saint-Cyr, served in Franco-Prussian War, and

upon Visé, and there found the bridge destroyed. Behind the cavalry forces came an army composed of the seventh, eighth, ninth, and eleventh corps. At the same time two other corps were concentrated at and near St. Vith—thus making a force of about 300,000 men on the roads leading into Belgium and converging on Liège. On the 5th a demand was made on the governor of the fortress of Liège, General Léman, to allow an unopposed passage to the German army. This demand refused, the forts east and northeast of the town were attacked, but the Germans were repulsed. On the night of August 5 and 6 an attempt was made to break the Belgian line between the Meuse and the Ourthe, and succeeded in forcing the troops between the intervals of the forts to fall back. The mobile troops of the defense were now withdrawn to join the main army, leaving their garrisons in the forts. On the 12th large calibre fire was opened on the forts of the right bank, and by the 17th the last one had fallen to the Germans. During this time the main Belgian army had taken up a position on the Gette. On the 12th this stream was forced at Hælen, but an attempt to pass on was repulsed. Fresh troops came up and threatened to turn the Belgian left; on the south they occupied Tirlémont; on the 18th the Belgian position was critical. Hence but one course was open to the Belgians: they retired on the 18th at dusk to take a position on the left bank of the Dyle. But the Germans advanced so rapidly that the Belgians could not safely stop, and were forced instead to continue their way to Antwerp, which they reached on the 20th. The Germans entered Louvain on the 10th, Brussels on the 20th, and crossed the French frontier on the 24th.

Namur was taken under fire on the 20th and 21st of August; on the 25th the last fort, Suarlée, fell. Here, as at Liège, heavy calibres were used. The commander of the 4th (Belgian) division withdrew his forces on the night of the 23d and 24th of August, and succeeded 10 days later in entering Antwerp.

A new part now fell to the Belgian army. August 20 it had taken up a position resting on the forts of Antwerp with a detachment at Termonde. Its business now was to detain as large a force as possible, to take the offensive whenever an important engagement took place elsewhere, and to attack in the neighborhood of Antwerp whenever there was any chance of success. Accordingly a sortie was made August 25 and 26; on September 4 a German force that had driven its garrison out of Termonde crossed the Scheldt, but on the appearance of Belgian forces on the left bank crossed back, leaving Termonde once more in Belgian hands. After this date all hostile efforts to cross the river were checked and the line of retreat to the west kept open. Other operations took place, as on September 9, when the Belgians got as far as Louvain and forced the recall of a division from France to Antwerp. One effect of these operations was to delay for two days the march southward of a German corps, at the time when the retreat from the Marne had begun.

The fall of Antwerp was however only a question of time; the siege began on September 28, and in a very short time it became clear that the place could no more resist the German artillery than had Liège and Namur. A delicate question then presented itself: to hold Antwerp as long as possible without compromising the retreat.

Day by day the Germans continued their work of demolishing the detached forts of the place and drew closer and closer. On October 5 Liège was occupied and the river crossed below the town. On the 3d and 6th of October they tried without success to cross the Scheldt. Furthermore, in France, the German right was steadily approaching the sea; if they could reach it before the Belgians had made good their retreat these latter might be entirely cut off. The better to secure this retreat Ghent was occupied on the 9th by the French and British (7th division). The retreat however began on the evening of the 6th, and by the morning of the next day the entire Belgian army was across the river. The Germans had indeed crossed the Scheldt themselves, on the 6th at Schoonarde, but were unable to interrupt the retreat. On October 10 Antwerp capitulated, and on the 15th the Belgian army took its stand on the Yser, 82,000 strong. The subsequent fortunes of this army are bound up with those of the Franco-British forces on this front.

Invasion of France.—When it became evident that France was to be invaded from Belgium, the 3d (French) army moved up (August 10) to Longwy, with the 4th army taking a position further west, and the 5th stationing itself between the Sambre and the Meuse. General French (August 23) stood between the Sambre and the Scheldt, on the line Condé-Binche, with so much of the British expeditionary force, two corps and a cavalry division, as had crossed to the Continent. The German armies that had concentrated on the line Aix-la-Chapelle-Malmédy-Trèves-Metz-Strassburg now moved out, Von Kluck through Belgium, Von Bülow to the Sambre (Namur-Charleroi); Von Hausen and the Duke of Württemberg across the Ardennes on Dinant and Neufchâteau. The Crown Prince crossed Luxemburg. The Crown Prince of Bavaria marched against de Castelnau and in this region the general action opened on August 20, with the driving back of de Castelnau (invasion of Lorraine), who, however, brought up firm before Nancy, September 7. As early as August 15 some French troops had crossed the Belgian frontier and had engaged the Germans in minor affairs (e.g., Dinant). On the 22d Charleroi was taken by the Germans, who on the 23d attacked the French at this place and the British at Mons. As the 3d and 4th (French) armies were compelled to withdraw before an attack coming from Belgian Luxemburg, the right flank of the fifth army extending almost up to Namur was exposed, and that army withdrew. This in turn compelled the withdrawal of the English from Mons, and so the whole Allied army now retreated, vigorously pursued by the Germans, on the line Paris-Verdun. In spite of one or two checks suffered in the advance, as at Guise, it may be said that on the whole this movement was up to a certain point irresistible. That point was reached when the Allies turned on crossing the river Marne, and not only defeated the Germans, but forced them to retreat to the Aisne. The French generalissimo, Joffre, had constantly kept before him the plan of so turning in the retreat from the Belgian frontier, and had selected the line Paris-Marne-Verdun as the proper place, and Sept. 6, 1914, as the proper date.

On Aug. 20, 1914, General Joffre assumed command of the Allied armies in France. He had before him the infinitely grave problem of

developing suitable powers of resistance, mostly out of beaten and retreating armies, and of selecting the time, place, and manner of applying these powers, which he did at the Marne (to be described later). After that battle the Allied armies under his command successfully held off the Germans, thus upsetting their plans of crushing France before proceeding to conquests elsewhere.

The Approach to Paris.—During the retreat two new armies had been formed: one under General Foch* (the ninth), which took position between d'Esperey's (formerly Lanrezac's) and Langle de Cary's; and another (the sixth) under Manoury from Paris. This last army was to rest on the intrenched camp of the capital, face east on the right bank of the Ourcq, and attack Von Kluck's right. It is a sound principle of warfare that victory may be obtained only by beating the hostile army. When therefore the Allied armies passed into the Paris-Verdun gap, Von Kluck, sweeping down on Paris from the north, properly turned south-eastward after the enemy. But he had not reckoned upon the formation of the sixth army sent out from Paris, in motor vehicles of every description to take its place on the battle front. Before, however, taking up the Battle of the Marne, we must very briefly describe what had in the meantime been taking place in eastern France; the pressure in this quarter, indeed, culminated in conflicts contemporaneous with and forming a part of the great battle of September 6. Before the sudden swerve of Von Kluck from Paris on September 4, it seemed as if the prediction that the Germans would be in Paris six weeks from the outbreak of war was about to be fulfilled. General Gallieni had begun to prepare the city for a siege. The noise of the battle could be heard by the Parisians.

Events before the Marne.—After the declaration of war the French invaded both Alsace and Lorraine. These invasions came to grief. The French twice occupied Mülhausen; the first time they were driven out, the second they retired of their own accord. They had also reached Saarburg and Saarbrücken. These invasions undoubtedly had a political end in view, conditioned of course by the possibility of military success. Incidentally, the Alsace operations were to contain troops that otherwise might have been used to resist the invasion of Lorraine. This invasion opened well enough: the French occupied Dieuze, Morhange, Château-Salins, across the frontier. But it came to naught at Morhange, in which the French, completely beaten, were driven back across the frontier, and were forced to settle down to the real business of protecting their eastern frontier. The Germans, early in August, occupied Cirey, Badonviller, and Baccarat. Farther north the army of Metz got to within 15 miles of Verdun. Still farther north the army of the Crown Prince, which had on August 22 crossed the frontier near Longwy (occupied the 27th), drove back the French, and finally took up a position between Bar-le-Duc and the Ardennes, facing eastward, and opposed by Gen-

eral Sarraill's army. To the west of the Crown Prince the Duke of Württemberg, who had crossed the Meuse near Mézières, formed up, facing south between the Crown Prince's army and Epernay. The first French army (Dubail) in front of Epinal faced the east; on its left General de Castelnau continued the line east and north of Nancy, along the Meuse, until it rested on the defenses of Verdun. The garrison of Verdun carried it on east, north, and west of the position until it joined with Sarraill's army.

With the armies in these positions Nancy was attacked; its main natural defense in the chain of hills known as the Grand Couronne de Nancy. The Germans occupied various towns in the east, e.g., St. Dié, but not without some heavy fighting in the Vosges. On the north they pushed the French back to the Grand Couronne, but never got beyond it. The main army marched from Château-Salins and engaged the French in a series of stiff fights around the Forest of Champenoux. At the same time a part of the army of Metz, with its left resting on Pont-a-Mousson, joined in the attack. Six miles north-east of the city, on the plateau of Amance, de Castelnau had assembled his artillery. Before the troops from the north could coöperate with those from the east in attacking this position, Ste. Geneviève, 10 miles or so northwest of Amance, had to be occupied. Here Foch (August 22), with a modest force, defeated the Germans with fearful slaughter. The attack on Nancy from the east through Amance was equally unsuccessful. After much fighting along the entire position the bombardment of Amance began on August 30, 31 and lasted for more than a week. The contest over the entire line increased in intensity; indeed, from the German point of view, it could do no less, for now (September 7-8) their armies were being pushed back from the Marne, and it was vital to their success that they should break through. The Emperor himself was present at the great assaults, six in number, made on Amance, and all driven back with loss. Checked before Nancy, the Germans on September 10 evacuated Pont-a-Mousson, and on the 12th, Lunéville, St. Dié, and some smaller places. They now concentrated their efforts between Toul and Verdun, with the purpose of surrounding the latter place. To this end they bombarded Fort de Troyon on the Meuse south of Verdun and several times attempted to take it by assault. But the fort made an extremely gallant defense, and although almost reduced to extremities, managed to hold out. The final assault was delivered on the 13th of September. On the 20th a fresh advance was made on the fortresses from the east to cross the Meuse south of Verdun. The garrisons of Verdun and Toul respectively pushed out attacks on the German flanks, while the Germans themselves advanced in the centre and captured the point of St. Mihiel on the Meuse (September 25).

Grip on St. Mihiel.—The Germans crossed the river on the 26th and began to march northward towards the Aire valley. A situation was then developed that might have proved of the utmost consequence to the French. To meet it, Sarraill came down from the north, and the twentieth corps was hurried up from near Champenoux. At 5 p.m. of the 26th the advanced guard of the corps, which had crossed at Lironville, got contact with the enemy. After some extremely heavy fighting the Germans fell back to the Meuse and intrenched at

* Ferdinand Foch, born (1851) at Tarbes, Hautes Pyrénées, of a Basque family; served in the Franco-Prussian War as a subaltern; artillery captain at 26; professor of tactics in the Ecole de Guerre for five years and later, as general of brigade, its director; in command of various divisions before European War; during war commander of northern armies in France, gaining victories of the Marne and Ypres; known internationally as a strategist and author of *Principles of War and Conduct of War*, published in French, English, Italian, and German; received British G.C.B.

St. Mihiel, keeping their footing across the river at Camp des Romains.

While these operations were taking place on the east and south, the other German armies had proceeded southward in pursuit of the retreating French and English (as related elsewhere). On September 6, the Crown Prince's army stretched from a point southwest of Verdun to the neighborhood of Bar-le-Duc. Verdun was thus almost completely surrounded. But the tide turned with the German defeat of the Marne; they retreated northward and divided right and left at the forest of Argonne. This rocky, hilly forested ridge, about 30 miles long north and south and 8 miles wide, then became the scene of incessant close fighting all through the autumn and winter. In the northern part of the Argonne Forest the Aire runs west to fall into the Aisne. This pass, called the Gap of Grand Pré, pierced as it were by a railway, would have been useful to the French, and so was one objective kept constantly in view by them in the operations of this region. These now took on the character that prevailed farther in the west, trench warfare, with the French pressing the Germans slowly back. Farther south there was much fighting on both sides of the St. Mihiel wedge, and in the Bois le Prêtre to the eastward.

In Alsace, after the second evacuation of Mülhausen, the French took up and held an intrenched position in front of Belfort from Thann to Moos until winter, when they fell back a

The Battle of the Marne.—Between the close of the retreat and the battle about to be described air reconnaissances, etc., had revealed the fact that Von Kluck had changed direction to the southeast. The Battle of the Marne opened on Sunday, September 6. On the 3d the British had fallen back of that river and later had taken up a position behind the Seine. About this time (September 4) Joffre had resolved to take the offensive, wheeling up the left flank of the sixth army, pivoting it on the Marne, to move on the Ourcq. The British were to fill the gap between the sixth and fifth French armies. German troops had been reported moving southeast along the left bank of the Ourcq on the 4th and were now halted and facing that river. Heads of columns were also seen crossing at Changis, La Ferté, Nogent, Château Thierry, and Mezy. The Allies' line on the 6th reached from Ermenonville, in front of the left flank of the sixth army, through Lizy on the Marne, Maupersuis, to Esternay and Charleville, the left of the ninth army under Foch, and so along the front of the ninth, fourth, and third French armies to a point north of Verdun.

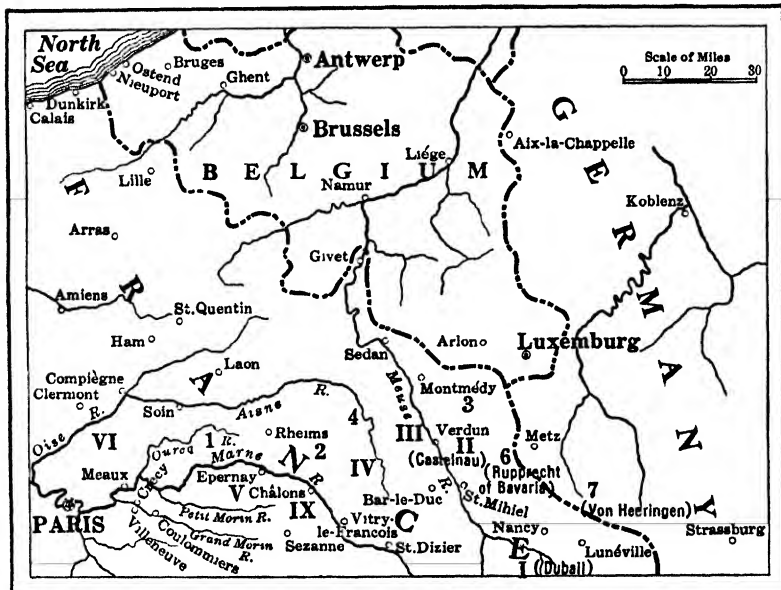
Recollecting, then, that the first and second French armies based on Belfort-Verdun were facing the German seventh and sixth, the French order of battle on September 6 was: the third army (Sarrail) Verdun-Bar-le-Duc, opposed by the German third (Crown Prince); the fourth (de Langle de Cary) across the plain of Champagne, south of Vitry-le-François, facing north, and

opposed to the German fourth (Prince of Württemberg); the ninth (Foch) Mailly-Sézanne, opposed to the German second (Von Bülow); the fifth (d'Esperey) Esternay-Courtaçon, with Conneau's cavalry on his left. The sixth army (Manoury) held a line north and south, with its right at Meaux and its left near Betz. The fifth and sixth armies were to engage Von Kluck. The gap between the fifth and sixth (French) armies was held by the British five divisions and five cavalry brigades, Villeneuve-le-Comte to Jouy-le-Château.

Von Kluck left two corps (II and IV) on the east bank of the Ourcq to hold the sixth army,

while he proceeded with III, IV, and VII to Coulommiers, Rébais, and La Ferté Gaucher to attack the left and centre of the fifth (French) army. He had pushed forward two cavalry divisions towards Coulommiers and Crécy to give notice of any attack possibly coming from that quarter, and had occupied the villages on the west bank of the Ourcq.

The battle began at daylight September 6 by



ARMIES AT BATTLE OF THE MARNE.

Roman numerals indicate French armies; Arabic figures German armies.

III, Sarrail; IV, Langle de Cary; IX, Foch; V, d'Esperey; VI, Manoury.

6 and 7, Heeringen; 3, Crown Prince; 4, Prince of Württemberg; 2, Von Bülow; 1, Von Kluck.

little nearer to Belfort. Trench conditions developed here also, except that there were desperate struggles to take and hold Hartmannswillerkopf, a mountain about 2900 feet high some miles to the north of Thann, which changed hands several times. Apart from various thrusts and points at German territory, the main purpose of the French was to cover the great position of Belfort. In this they succeeded.

the advance of the sixth army against the villages just mentioned, and became general over the whole line from Paris to Verdun. In this struggle the British at once took a hand, and moving northeast, drove back Von Kluck's cavalry and advance guards. In the words of Sir John French, it must have been at about noon "that the enemy realized the powerful threat that was being made against the flank of his columns moving southeast." By night the British had reached the line Dagny-Coulommiers. This retreat of the Germans uncovering the west flank of the troops operating against the fifth army forced these to withdraw and enabled the fifth to reach the Grand Morin between Esternay and La Ferté Gaucher. In the meantime the struggle further east had been most serious. Foch was heavily engaged with Von Bülow, and on his right with Von Hausen. On the whole, the centre had all it could do to hold its own, while the right even fell back a little. The day closed with the balance leaning a little in favor of the Germans, except on their left, when Von Kluck began to realize that he must look to his right as well as to his front. September 7 was a day of desperate struggle, with the Allies progressing in the west, but not elsewhere. On the 8th the German right was definitely turned, and began to retreat. On this day, d'Esperey carried Montmirail, and thus made an opening on Von Bülow's right. Into this opening Foch pushed his left, and he is reported to have discovered a gap between Von Bülow and Von Hausen, of which he also took advantage. The third and fourth armies on this same day held on only by the most devoted courage in face of the equally devoted attacks made upon them. September 9 saw the scale turn in favor of the Allies. The line of the Ourcq was taken; French and d'Esperey joined hands at Château Thierry in the evening. Foch drove a part of Von Bülow's right into the marshes of Saint-Gond and attacked his left with success, while the Saxons on Von Bülow's left, after heavy losses, were pushed back towards Châlons. The third army still held. By the 10th there could be no doubt that the Allies had won a victory: the Germans retreated, and in good order, to the Aisne, where they occupied a line said to have been prepared in advance.

The Battle of the Marne must be regarded as a significant defeat for the German army. Flushed with success, having the initiative, opposed to troops supposedly dispirited by defeat after defeat during a long and exhausting retreat, the Germans found this check as unexpected as the French found it welcome. On the French side moral forces were developed whose intensity continued undiminished. The Germans, although not disabled, were nevertheless compelled radically to change all their plans of operation.

The German position on the Aisne extended from a point on the Heights of the Meuse north of Verdun, west across the Argonne country and the plain of Champagne to Rheims, northwest across the Aisne, west along the Heights of the Aisne to the Forêt de l'Aigle, north of Compiègne. This position was of great strength, carefully intrenched and thoroughly supplied. The Allied armies followed the Germans in their retreat. On the morning of the 13th the British advanced, and in spite of the resistance of the Germans passed the Aisne on pontoon bridges, a remarkable military achievement. The Allied lines, September 21, reached from the extreme south of Alsace through St. Dié, Lunéville, Pont-

à-Mousson, Consenvoye, Grand Pré, Souain, Craonne, Noyon, to Le Catelet. Strong German forces held St. Quentin. In the east the Germans had pushed their way along the promontory of Hatton Châtel towards St. Mihiel and were shelling the forts of Camp des Romains and des Paroches. On the 26th they crossed the Meuse near St. Mihiel. Ypres was occupied on October 14 by the British seventh division, which had assisted the withdrawal of the Allied troops from Antwerp. A period of deadlock now followed on the Aisne, during which each adversary made the most determined efforts to outflank the other on the west.

From the Aisne to Flanders.—These efforts were logical for both sides. An attack on the German left, even if successful, would not interfere with their communications through northern France with Belgium and Germany. A frontal attack would have called for resources not then in the possession of the Allies. To turn their right, however, might result in cutting some of the communications, might even save Antwerp. It would in any case assist the retreat of the Belgians and British from that city. Moreover, it was not impossible that the Germans might strike at Calais and Boulogne; it was not inconceivable that they might even push their way as far southwest as Abbeville. Accordingly about September 20 an army was formed west of Compiègne, and its command given to de Castelnau, who was to fill the gap between the Oise and the Somme, and to push his lines north of the Somme; as objectives he had St. Quentin and La Fère. On the 21st de Castelnau's right had moved as far as Noyon; there was violent fighting around Lassigny. From Lassigny the French right moved towards Roye, while their left momentarily occupied Péronne. The Germans in the meantime concentrated a large force in the region, formed in part of troops drawn from the centre on the Aisne, and from Lorraine and the Vosges. On the 25th the French near Noyon were pushed back on that day and the next two, and the whole line as far as the Vosges was engaged. De Castelnau was driven from Lassigny, but during the next few days managed to hold his own. There was now some danger that the Germans would themselves outflank the French; to meet this possibility a new army (tenth, Maud'huy) was formed. De Castelnau was now merely to hold his position. Maud'huy's line ran from the Ancre through Arras and Lens to Lille, and his plan would be to move on Valenciennes. The Germans, who were in force in the region of Cambrai and Douai, planned to take Lille, turn on and force back Maud'huy; at the same time other forces would advance on Boulogne, Calais, and Dunkirk.

The battle opened October 1, and by the 4th the French had been pushed back west of Lens, and were beginning to retire to the hills behind Arras. On the 8th the Germans shelled Arras, and later attempted to take the town, in which they failed. They had succeeded, however, in repelling Maud'huy's offensive, and had prevented the turning of their flank. It was now decided to move the British force from their trenches on the Aisne to the left of Maud'huy, who now, like de Castelnau before him, would remain on the defensive. The situation of the Allies was critical. Antwerp was about to fall, the Lys had been crossed by the Germans and Ypres occupied by them (October 3). The channel ports as well as Lille were in danger.

The presence of Germans in the region about Hazebrouck and Ypres implied an attempt either to intercept the British and Belgians retreating from Antwerp, or to turn Maud'huy's left in the region of Lens. Joffre therefore decided to concentrate still another army between Lens and Dunkirk, which, with the British, was to form the extreme left of the Allies. This army was to be commanded by General d'Urbal, while Foch was to take general charge of the four armies—de Castelnau's, Maud'huy's, French's, and d'Urbal's. The transfer of the British forces was successfully accomplished; they were to take position north of the line Béthune-Lille, attack the enemy opposing Maud'huy's left wing west of La Bassée, and attempt to defend or recover Lille, as the case might be.

The country in which the operations of many months on the left of the Allies were to take place consists essentially of the plain of the Scheldt. This plain is broken by no natural obstacles but is intersected by many canals. The Scheldt bisects it roughly and receives the Lys at Ghent. On the western boundary of the plain rises the higher land running from Calais southeast to Péronne, at the base of which runs a series of waterways, mostly canals, forming as it were a wet ditch to the table-land to the westward. The ditch was held by the French. The Germans occupied Ghent, Bruges, and Ostend, and succeeded in capturing Lille, but were driven east of Ypres by the British. Further south, the Allies pushed the Germans back towards Lille between the Lys and the Béthune-Lille Canal. While these movements were going on the other French armies still further to the south were in conflict with the Germans from Béthune to Compiègne.

This period is signalized by Joffre's third attempt to turn the German right. Lille, although held by the French, was in danger of being cut off by the advance of the Germans west of the city south of the Lys, and the possibility was still strong that the Germans might make a rush for Calais and Dunkirk, or else try to crush the British and Belgians in retreat from Antwerp. Hence Lille was to be saved, if possible, and at any rate the other purposes of the Germans were to be negated at any cost.

The offensive was taken up by d'Urbal's army, the British Seventh Division, and the main forces of the British coming up from the Aisne. On October 11 the Allies engaged the Germans in a position extending from Mont-des-Cats southwest of Ypres through La Bassée to Vermelles. Part of this position was carried, but the main purpose, to drive the Germans out of La Bassée and to save Lille, failed. On the 10th this city had been bombarded; on the 13th it was surrendered. To the north the Allies had met with some success, driving the enemy from Ypres as their comrades were entering Lille. On the 17th the Allies lay approximately north and south from the Forest of Houthulst, holding the villages of Langemarck, Poelcapelle, Passchendaele, and east from Ypres to Zonnebeke and south to Wytschaete and Nieppe.

Battle of the Yser.—On October 16 the Germans attacked Dixmude and opened the Battle of the Yser. The left wing of the Allies now stretched from Compiègne through Arras, Ypres, and Dixmude to Nieuport. With the command of the sea in the hands of the Allies, the efforts of the Germans were necessarily confined to the fronts Nieuport-Béthune and Béthune-Compiègne. The nature of the ground north of

Béthune greatly influenced the character of the operations, at first rolling, and then, as the sea is approached, flat and open, filled with dikes and ditches. From Nieuport to Dixmude the line was held by the Belgians and French colonial infantry. Then from Dixmude past Zonnebeke came French Territorials and cavalry, then British, who continued on to Béthune. From Dixmude to Nieuport the Yser is canalized, and 15–20 feet above the ground to the west, across which runs the embanked railroad between the same points. As the country could be flooded, the bridge crossings were more than usually important. Off the roads the ground was difficult to cross, by reason of ditches, dikes, etc., and, moreover, was marshy, so that artificial cover could not be made. For eight days, by night as well as by day, the Germans assaulted the Belgian position only to be repulsed and beaten back. The British monitor fleet, mounting 6-inch rifles, did great service shelling the German right and rear, during which Knocke was partially destroyed. The conduct of the Belgians and the French colonial infantry during these eight days was beyond all praise: they had held their position against superior numbers backed by artillery under the most terrible and discouraging circumstances, and had successfully prevented the desperate efforts of the Germans to break through across the position to Dunkirk and Calais.

The plan of the Allies had been to fight a defensive battle on the Yser, and to attack with their centre and right in front of Ypres and south of the Lys respectively. French's specific objective was the capture of Menin on the Lys, halfway between Roulers and Lille, as necessary to an offensive that should take Bruges and thus cut the German communications. To hold the road Menin-Roulers-Ostend was essential to German success, because from it ran out westward all the roads leading to the Allied line between Ypres and the sea. Heavily reinforced on the 19th, the Germans themselves took the offensive, captured Roulers, most of the Roulers-Dixmude road, and all of the Menin-Roulers-Dixmude-Ostend road and railroad.

The Menin operation failed. The plan assigned to Sir Douglas Haig,* to push through and if possible to capture Bruges, became impossible of accomplishment, for the Germans, in spite of the most determined resistance, in spite of frightful losses, were gaining, and it became evident that the best the Allies could hope for was to hold on until reinforcements could come up. By the night of the 22d the Germans had crossed the Yser Canal at Tervaele, and north of Ypres had pierced the Allied lines. South of that city there was only a thin line, and the right of the Allies was withdrawing from the Givenchy-Radinghem ridge. But on the 23d the Allied prospect brightened. The Forty-second French Division (Grossetti) with howitzers had reached Furnes and relieved the Belgians in Nieuport. On the night of October 23–24, 14 assaults were made on Dixmude and

* Sir Douglas Haig, born (1861) in Fifeshire; educated at Brasenose College, Oxford; served with distinction in the Sudan and in South Africa; later held important posts of India, being chief of staff (1909–12); was general officer in command at Aldershot (1912–14); general in command in the First Army from landing of expeditionary force in European War (1914); distinguished himself in the retreat from Mons, at the Aisne, at Ypres, and Neuve Chapelle; succeeded Sir John French as commander in chief of British forces in France and Belgium (December, 1915); G.C.B. and Grand Officer of the Legion of Honor of France; author of *Canadian Studies* (1907).

all repulsed. North of Ypres, British reinforcements had come up, moved on the enemy, captured their trenches, and beat back five attempts at recapture, and in the evening of this day a division of the French Ninth Corps was moved into the line.

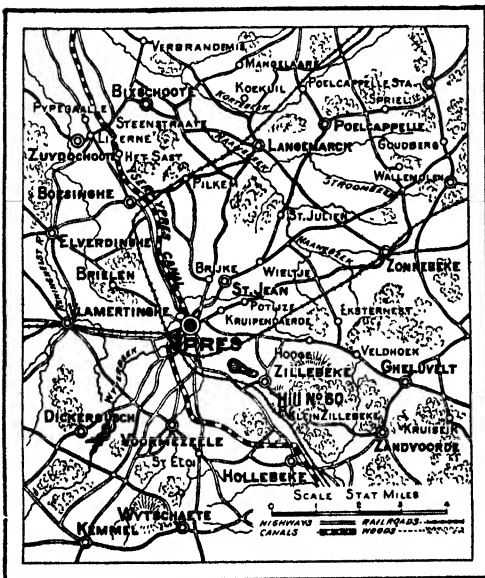
So far the Germans had failed to break through. On the 24th the French on the left stormed Lombartzyde and moved on Westende, thus menacing the German right. To prevent this the Germans opened a determined attack on Nieuport, and along the Yser Canal as far south as Dixmude. These attacks failed. The next day the battle was renewed; guns were mounted on the dunes to beat off the fleet. So tremendous was the effort made that Joffre, October 25, resolved to flood the country. But the water was slow to spread over the meadows. In the meantime the Germans continued their attack, and on the 26th seemed to be in a fair way to reach Pervyse, halfway between Nieuport and Dixmude. On the 28th they attacked all along the line. But in the meantime Joffre was hurrying up reinforcements, and the water was rising. The next day attack after attack was made on Pervyse-Ramscapelle, and the latter place was captured that night. The 30th found the British fleet reinforced by five destroyers, the Germans in Ramscapelle and along the railroad, but between it and the canal embankment the water was mounting. All day the struggle continued for Ramscapelle, the embankment, and Pervyse. The 31st saw the Germans driven back across the railroad and the inundated region east of the canal.

Battle around Ypres.—The Battle of Ypres is not a separate event from the Battle of the Yser. They really overlapped, and are indeed only periods of increased intensity of combat distinguished by the prominence of a special objective on the part of the Germans, and of a special effort by the Allies to prevent the realization of that objective. Both of these battles are by the French denominated the battles in

of above and by the expulsion of the Germans from Ramscapelle. The scene now shifts to the southward, to the attempts made by the Germans to capture Ypres in the pursuit of the objective still held by them, to wit, to break through the Allied lines to the French channel ports.

On October 24 the Allied lines ran in a great arc from Dixmude through Langemarck, Gheluvelt, through the woods southeast of Ypres, along the eastern ridge of the Mont-des-Cats, across the Lys, to La Bassée. This position was energetically attacked on this day by the Germans, who very nearly succeeded in taking possession of Gheluvelt. Attacks on Mont-des-Cats were beaten off. At various other points likewise the Allies held. On the 23d a French division had entered Ypres, and for the first time East Indian troops entered the trenches to do battle for the Empire—Gurkhas, Sikhs, etc. They were afterward withdrawn, for climatic reasons, it was said. Fighting continued through the 25th, and on the 26th many attempts were made against Nieuport-Dixmude line. The advantage this day lay on the whole with the Germans, who had moved up the Menin-Ypres road, capturing Gheluvelt, and, south of the Lys, had got hold of part of Neuve Chapelle. On the 28th Gheluvelt was recaptured by the British, who also drove the enemy to the edge of Neuve Chapelle. Returning to the attack, the Germans recaptured the entire village, only to be driven out again, this time by a force composed in part of East Indian troops. Passing over the fighting of the next day or two, on the 28th a wireless was intercepted, saying that the Germans would attack next morning. On that day (the 29th) the French south of Béthune took the offensive so as to keep as large a force as possible of the enemy from joining in the struggle around Ypres. On the 30th and 31st French reinforcements continued to arrive.

The Allied position on the morning of the 31st ran from Zonnebeke on the north to Festubert on the southwest. The eastern ridges of Mont-des-Cats were still held by the Allies; south of this the line extended to the Lys, crossing it and curving around Armentières to Neuve Chapelle and thence to Festubert. The German plan was to hold on the flanks and to make their main attack on the centre to Ypres: if the centre could be broken, and the ridge of Mont-des-Cats captured, the Allied forces would be cut in two, and permit either an advance on Boulogne or an attack south of the Lys against the Allies intrenched there, or indeed both. At daybreak the Germans opened an intense fire on the lines southeast of Ypres and drove the British back into their reserve trenches. An equally violent attack was made across the Ypres-Comines Canal, which also drove back the British. At one or two points the lines were momentarily broken. In general the Germans had advanced in the centre and were within a very few miles of Ypres. In the north the French had taken Bixchoote and reached Passchendaele. On the Yser, at Ramscapelle, the Germans were hurled across the canal, and farther south the French pushed their offensive in the direction of Roulers. But in the centre a tremendous effort was made to crumple up the British line and capture the ridge of Mont-des-Cats and Ypres. The defense made by the British, outnumbered and outgunned, against the successive attacks of the Germans



YPRES BATTLE FRONT.

Flanders, a better name than Yser and Ypres. However this may be, operations on the Yser proper were checked by the inundation spoken

will ever remain remarkable in their annals. These attacks came very near succeeding; the thin British lines, worn out by their efforts to hold, exposed to artillery fire, began to fall back, and the guns were even withdrawn to Ypres. The roads behind the Germans were filled with motor vehicles ready to take the troops to any point of the field. But at this moment the British stood their ground. The Germans coming up the Menin-Ypres road were stopped, and were driven out of the woods east and southeast of Ypres. To the south the defense was equally spirited, keeping the Germans from reaching the ridge of Mont-des-Cats. November 1 the Germans took Wytschaete and Messines, villages at the foot of the ridge, but failed to make the ridge itself. The struggle continued during the whole of this day; the Germans were driven out of Wytschaete, but the village was abandoned. On the 2d Neuve Chapelle was carried, but the attempt on Armentières failed. North of the Lys renewed efforts to gain possession of the ridge of Mont-des-Cats proved unsuccessful. On the 3d the French took the offensive from Dixmude-Nordschoote; the effect of this was to hold back forces that otherwise would have moved against the lines farther south.

And so it went day after day. The Germans made another great effort on November 10, when they shelled Dixmude more heavily than ever before, blew up the French trenches and advanced against the town. After a terrible hand-to-hand fight the French withdrew to the west of the Yser. On the remainder of the front artillery played and assaults were made. The 11th opened with tremendous artillery fire from both sides of the Menin-Ypres road, lasting three hours. Immediately afterward 15 battalions of the Prussian Guard advanced from the east, while at the same time charges were undertaken by other troops. Everywhere north of the Lys the Allied front was attacked. Everything failed except the effort of the Prussian Guard, who got up to within a few yards of the trenches only to recoil and finally to retreat before the blasting fire that greeted them. The Battle of Ypres was over, after having lasted one month, with staggering losses on both sides. It must be accounted a German defeat.

The conclusion of the battles of Flanders, Nov. 11, 1914, marks the beginning of what may be called the long siege of the armies over the whole line from the sea to the Swiss frontier. It was a time of ceaseless watching, of hardship and trial, of continuous fighting with neither side able to advance at the expense of the other. Local advantages gained first by one and then by the other adversary in no way affected the issue, and indeed, as measured by the ground gained, could not be represented on an ordinary map. A word is perhaps not out of place in respect of the nature of the contest that now became the rule over the entire western front. Trench warfare over this front took the place of what may now be called old-fashioned operations in the open. Mining and countermining became the rule: the lines in reality were areas of parallel trenches protected by networks of barbed wire so thickly interlaid and interwoven that only long-sustained artillery fire proved equal to breaking them down in clearing the way for assault. The troops lived in and under the ground, so that the shrapnel, the ideal man-killing projectile against troops in the open, proved nearly useless, and was replaced by the high explosive shell, able to pierce overhead

shelter and overwhelm the occupants. Operations degenerated into a struggle of wear and tear. So close did the lines draw to each other that antiquated methods and weapons sprang into new life: hand grenades, knives, and even clubs for close work. Trench mortars came into existence. Asphyxiating gases, in violation of The Hague Convention, were used. Artillery took a position of first importance, as was but natural, seeing that a state of siege warfare had developed. The reason of this state of affairs is to be found, in part at least, in the air service, making surprise well-nigh impossible, and allowing time for the threatened side to make ample preparations to resist any impending movement. It also greatly increased the efficiency of artillery by enabling batteries to correct their fire, and by discovering and assigning targets invisible from the batteries themselves. In this tremendous struggle some few encounters deserve passing notice before going on to the serious attempts made by the Allies to break through the German lines. Thus the French took Vermelles on December 7; later in the month there was some extremely heavy fighting in and near Givenchy, followed a few days afterward by the capture of St. Georges by the Allies (French and Belgians). Jan. 3-4, 1915, was marked by a French victory at Steinbach in Alsace. Soissons, too, became the scene of great activity. North of this city the French on January 8 captured Hill 132, and pushed their way eastward. The German counter attack, made in force, drove the French in from the east, and finally recaptured Hill 132. The French were compelled to cross the river. Under any other circumstances this action would have constituted a considerable affair; in reality it was only an incident.

The next action standing above the general level was that in the region of La Bassée. On January 25 a German demonstration was made along the whole front, from Festubert to Vermelles and as far north as Ypres. Béthune was shelled. This contest lasted several days and ended in the repulse of the Germans. The French won some success in Champagne during this period, in the neighborhood of Perthes (February 16), and on the whole had rather the better of it until the month of March.

Battle of Neuve Chapelle.—The event of this period is, however, the Battle of Neuve Chapelle, an operation carried out by the British. The immediate purpose of the Allies was to carry this village, as the first step in an effort to pass on and capture the ridge Aubers-Ilies, held by the Germans, and curving westward between these two points. If this ridge could be taken, it was not impossible that the attack might even result in the capture of Lille, an event that would have been of the first importance to the Allies, as menacing the German position northward to the sea. Neuve Chapelle itself sits in the easterly angle of a lozenge formed by the roads breaking off from the main road La Bassée-Estaires. The village itself, with the eastern side of the lozenge, was held by the Germans; the western side by the British. Strongly reinforced, the British at 7.30 A.M. on the 10th of March opened a bombardment said to surpass in intensity anything ever heard before. It was effective everywhere except at the extreme north point of the front of attack, where it failed to break down the wire entanglement. After 35 minutes the fire was shifted to Neuve Chapelle, and the British infantry advanced.

In the village and south of it the attack succeeded, but to the northeast was held up by wire entanglement just mentioned. It held off the advance until the artillery succeeded in breaking it up. By 11 A.M. the whole village and wood leading from it northeast and southwest had been taken. So well directed was the artillery fire that the attempt of the Germans to bring up troops was completely stopped. The British, however, made no further progress.

The German fire had cut all or nearly all the telephone wires and communication with the rear became almost impossible. Furthermore the orchard north of the village had remained in German hands and so threatened the flank of the advance towards the Aubers-Illies ridge. There thus arose a delay of four and a half hours, which the Germans took full advantage of to repair their lines, organize fresh defenses in rear, and bring up reinforcements. When the British advanced again, they were stopped both north and south by machine-gun fire.

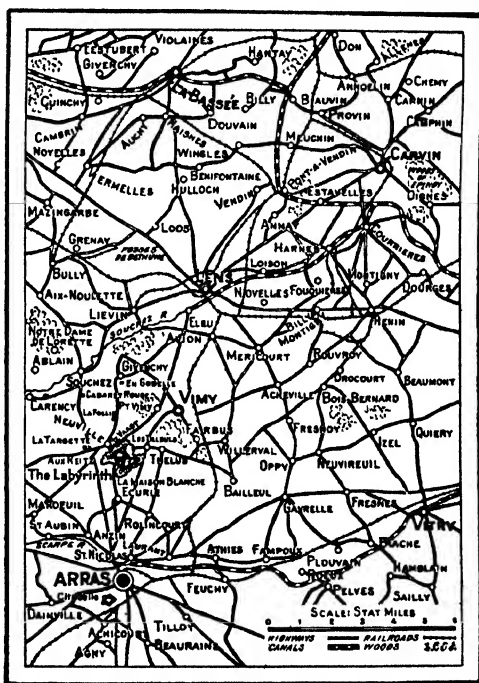
The next day found the British east of Neuve Chapelle, but the remainder of their plan had miscarried. On the 12th the arrival of German reinforcements put the British on the defensive. That night the British set to work to consolidate the positions won, some 1200 yards on a front of 4000. The 13th was taken up in beating off a few German counter attacks. On the 14th the battle died down on both sides. The British casualties were extremely severe, over 12,000 killed and wounded; so also were the German. The net result of the battle was undeniably a British defeat, in that they had failed to carry through their plans. But it is also undeniable that they had managed to break the enemy lines; whether the price paid was worth it, is doubtful.

After Ypres and Neuve Chapelle.—In the next month, April, 1915, the Germans made another great effort on a large scale to break through the Allied lines on the north and so gain the channel ports. In anticipation of their advance the British took the offensive themselves on April 17, with the result that, as before in the same region, the German plan was frustrated. The Allies were posted along an arc running from Steenstraete on the Yperlee Canal east, southeast, southwest, through Langemarck, through Broodsende-Becelaere, from which last point the line curved round to Hill 50 and to the Ypres-Comines Canal. The chord of this arc was formed by the Yperlee Canal to a point about a mile southeast of Hill 60. From this position the Allies were driven back to a line close to Ypres, with especially heavy fighting in and near St. Julien, where the Canadian contingent distinguished itself. The Germans even got across the canal at Steenstraete, and for a time the position of the Allies was precarious. In this particular battle of Ypres the Germans made use of deadly gases. By means of these the French troops defending the northern part of the arc were driven out; these gases were later again and again discharged against the British. Until respirators were furnished later, there was no living in the fumes let loose on the trenches under attack. Day after day the contest went on, the Germans attacking and the Allies resisting, with the utmost desperation. On the 30th a vigorous attack by the French pushed back the enemy on the north of the line. On May 8 a concentrated effort—one of many—was made to reach Ypres. Allied (British) attempts to push back the enemy coming

up on both sides of the Ypres-Roulers road were unsuccessful. On the 9th, fresh but unsuccessful attempts were made on Ypres. On this day the French were successful at La Bassée (Carency), the English unsuccessful south of the Lys. On the 11th, Ypres was severely shelled. On the 13th, the British met with some success on the Ypres-Roulers railway, as well as towards the north. The French on May 15 recaptured Steenstraete and got up to the canal; by the 17th they were masters of the left bank.

In its entirety this battle of a month's duration must be regarded as a defeat for the Germans. Setting out to take Ypres and break through, they had, in spite of many local successes, largely at least at the outset due to their use of poisonous gases, failed to carry out their plan. They had lost many thousands in killed, wounded, and prisoners.

During the later part of the struggle around Ypres the British made a second attempt to carry the Aubers ridge with the capture of Lille as the principal objective. The battle opened May 9 and lasted until May 20. The net result was that the Allied lines were ad-



ARTOIS BATTLEGROUND.

vanced some 600 yards over a front of 4 miles. This battle comprised two actions known as Aubers Ridge and Festubert.

Battle of Artois.—Before the contest before Ypres, just described, had closed, the French began the tremendous Battle of Artois, on the plateau of Notre Dame de Lorette and south of it, or the line La Bassée-Arras.

If this operation could be carried through, German communications behind it would be threatened and there might be a chance of taking Lille. The German positions on this front were of the strongest.

They held the high ground around Loos, the ridges north of the Souchez stream, and most of the plateau running south of Lens to the banks of the Scarpe. Upon this position had

been expended every effort of modern military science to make it secure. Between Souchez and Arras was a network of trenches known as the Labyrinth (underground), about 2 miles square. The ridge of Notre Dame breaks off abruptly to the south in spurs, the eastern one of which, the Souchez spur, commands Ablain St. Nazaire and a sugar refinery between Ablain and Souchez, held by the Germans. From one of these spurs trenches had been constructed across to the Arras-Béthune road. South of Ablain are the heights of Carency, connected by trenches with Ablain and Souchez, and by another series, the "White Works" (white chalk), with La Targette on the Souchez-Arras road. East of La Targette is Neuville St. Vaast, like the Labyrinth, an underground fortress. In other words, not only was the surface of the ground admirably fortified by elaborate trenches and redoubts, supplied with ammunition, etc., but subterranean areas had been excavated to house troops and supplies, where, safe from aerial observation and overhead fire, they could be kept until needed, to repel the enemy already exhausted and reduced by his advance.

General d'Urbal was in immediate command, assisted by Foch and Joffre, but to General Pétain, later to distinguish himself at Verdun, belongs the credit of the reduction of the Labyrinth. Seven corps were engaged, and over 1100 guns of all calibres had been concentrated for the preparation. For months the French sappers had been occupied in mining the German defenses. The battle opened at 6 A.M. on Sunday, May 9, by the fire of the 1100 French guns. Three-quarters of an hour later the Carency mines were blown up, as were others on the Notre Dame ridge. The bombardment lasted three hours and at 10 the infantry moved out. All day the battle raged. Three of the five trenches on Notre Dame plateau were carried; when night fell the French dug themselves in. South of Notre Dame, at the same time, the French attacked Carency, took the trenches, but failed to take a work on the east. They nevertheless pushed on to Souchez. La Targette was taken, as was part of the White Works. Passing on, a part of Neuville St. Vaast was then captured. On the 10th the fighting continued. On the 11th the attack on Neuville St. Vaast reduced the cemetery, but the Labyrinth still held out. The next day Notre Dame de Lorette fell, as did Carency. From Carency the French pushed on to Ablain St. Nazaire. But the Germans still held on to a spur of the Notre Dame ridge, the spur of the "White Way." On the 21st, however, the spur was carried, as was most of Ablain. A few Germans, however, still held the cemetery, only to be dislodged on the 28th. Three days later the French took the Souchez refinery and in June captured the Labyrinth. Indeed, fighting went on in this region until the autumn. Each side is estimated to have lost 60,000 men in this tremendous battle. Having regard to the ultimate purpose of the French in taking the offensive, it must be admitted that they failed: they had not broken through the German lines. Lille was still in possession of the enemy whose communications were still open. In all probability, however, the Germans had been kept so busy as to have no troops to spare for the attempt on Ypres previously described. And it was further proved that with sufficient preparation by artillery and mining German positions could be carried to a considerable depth.

Simultaneously with the Battle of Artois, there was considerable activity further east in the Argonne region and on the St. Mihiel salient, on the western front of which the French succeeded in capturing Les Eparges. They also met with some success on the southern face, on the edge of the Forest of Apremont. Southeast of Lunéville in the Vosges the Germans took the Ban de Sapt on June 22. In July it was recaptured by the French, who also made some small advances in Alsace.

Battle of Champagne.—The French check in the Artois country was followed by fighting chiefly in the Vosges, mostly of a local character. This continued until September, when the French opened an offensive for which they had long been making preparations. Apart from the advantage that would accrue if this offensive should succeed, there were reasons of a political order that called for something more from the Allies than mere nibbling at the German lines. The German campaign in the east was meeting with success. To counterbalance this success, and at the same time to relieve the pressure on the Russians, it was regarded as necessary to deal the common enemy a mighty blow in the west. To keep him ignorant of the precise point at which the blow was to fall, for weeks previous substantially the entire German position was subjected to intense bombardment. Beginning in the middle of August, this bombardment was especially heavy on the Belgian front in the Souchez region, before Arras and Roye, along the Aisne, in Champagne, and finally in the Argonne and Woëvre districts, and in Lorraine. As the time drew near for the infantry work, the bombardment increased in intensity over the front selected for attack. That front was in Champagne, between Auberive on the west and Ville-sur-Tourbe on the east, a distance of some 15 or 16 miles. The centre of the French line was defended by the 6th, 5th, and 4th armies. The front held by the 4th (Langle de Cary) was the one selected from which to deliver the offensive.

Some 4 or 5 miles behind the corresponding German position and roughly parallel to it, runs the Bazancourt-Challerange railway. If the French offensive could reach this railway a mischief would be done to the enemy, for this road communicated with Metz on the east. But the natural strength of the German position had been increased by the arts of the engineer. From Auberive this position followed the crest of the low ridge north of the Suippes River, rising, as it passed through Souain, then by Perthes, with Tahure behind (north of) it, and terminated at Massiges. To say that this whole position was intrenched is scarcely to do justice to the effort spent on its defensive organization; not only were there the usual trenches (lines) facing the enemy position, but cross trenches had been dug over the entire area, from which flanking fire could be delivered upon the enemy if he should succeed in passing the first and subsequent lines. There were really two positions, two miles or so apart, the first immediately in front of the French, the second on the reverse of the ridge. The area between them was a network of trenches and entanglements.

On September 22 the bombardment increased in intensity and was kept up until the 25th, when the French infantry broke out of its own trenches and gained practically the first line positions of the enemy by 12 o'clock noon. At some points, however, the Germans held, and the work therefore became in some sort a series

of isolated and detached actions. On the left the attack was exposed to the German artillery fire from the plateau of Moronvillers, in front it came up against the salients of the ridge. The first line was carried, however, and the right of this attack held all day, and later pushed on deeper and deeper into the German network. To the right of the St. Hilaire-St. Souplet road, much the same thing happened, the French left being stopped while the right managed to advance and took all four lines of trenches. Further east the enemy trenches were penetrated to a depth of about 500 yards, but machine guns stopped the advance. North of Souain the French met with pronounced success, carrying trench after trench almost to the Navarin Farm. Between Souain and Perthes the German position had been most solidly organized, but in its eastern portion the defenses were comparatively weak. Here the French delivered their main attack in this part of the front, the remainder (the left) playing a secondary part. The attack carried the French advance as far as the Souain-Tahure road. In the Mesnil sector (east of Perthes) the greatest difficulties were encountered, but still further east, north of Beauséjour, the French had better fortune, pushing north as far as Maison de Champagne. On the extreme right (Massiges) the colonial troops reached the top of the plateau in an incredibly short time, but could not advance, because of the effective machine-gun fire here developed. The first day's fighting therefore had pushed back the enemy lines in the centre: the flanks had not been driven in, but the French managed to secure the ground gained. In the west, on the 27th, the French got up to the Epine de Vedegrange, but no farther. On the next day the fighting died down in this sector of the battlefield. In the Souain sector the French on the 28th made contact with the second German position in these parts. Between Souain and Tahure, in front of Perthes, contact with this second position was also established, but here the French remained, digging themselves in, until October 6.

While all these events were occurring in the centre and left, the most desperate struggle of all was going on to the north of Massiges. From the plateau three long spurs run down like fingers, whence the name given to them and to the plateau from which they spring, La Main de Massiges. These were strongly held by the Germans. The French accordingly attacked across the back of the hand, and got up on the plateau.

The general result of this battle, the local and separate contests of which were not over before October 4, was that the French gained the Massiges plateau, the Tahure ridge, and various points in the German second position. The elaborate intrenchments and work of the first positions were taken. The total number of prisoners officially given was over 23,000; many guns and much war material fell into the hands of the French. But as in all the other cases of real battles, as distinguished from the daily local strife, on the long front, the German lines were not broken; they were merely pushed back. Although, therefore, the Germans had suffered a defeat in that they had been driven out of their positions, yet it must be admitted, on the other hand, that the French had been disappointed of their purpose. This apart, there can be no question as to the thoroughness of the German defeat. The French staff estimated the German loss in killed, wounded, and missing at 140,000.

Battle of Loos.—While this great battle was going on in Champagne, the Allies were renewing their offensive in Artois, the British in the Battle of Loos, the French in that of Vimy. As before in this region, the objective was to push into the plain of the Scheldt. Reinforcements both of men and of guns had given the British the necessary elements to undertake the offensive. Thanks to this increased strength, they had extended their trenches southward to Grenay, opposite to Loos and Lens. It is apparent, therefore, that in the month of September the Allies undertook a general offensive, for in addition to their two mighty efforts in Champagne and Artois, the Germans were kept busy in other regions of the front, by demonstrations on the extreme left, in which the navy took a part, in front of Ypres and also in the Vosges.

In spite of the Battle of Artois, the Germans still held the eastern slopes of Notre Dame de Lorette; from this point their lines stretched north in front of (west of) the Loos-Hulluch-Haisnes ridge to the canal near La Bassée; south, they curved through Angres and Liévin to Souchez, thence eastward of the high road from Béthune to Arras. Between Haisnes and Hulluch lay the powerful Hohenzollern redoubt, a work more or less like the Labyrinth. Their general position thus formed a sort of salient oriented southwestward on the axis Souchez-Lens. The plan contemplated that the British should drive at the northern side of the salient (Loos-Hulluch-Haisnes), the French at the southern (Vimy Heights). The capture of either of these positions would force the evacuation of Lens. The terrain over which the British were to advance was covered with villages, pits, galleries, slag heaps, and mine works generally, all connected by trenches. Moreover, the industrial pits and galleries had been taken over and extended by the Germans for war purposes. The entire area had been defensively organized, and equipped with machine guns, artillery, and small works and trenches generally. In front of the French position, northeast of Neuville St. Vaast, lay the wooded heights of Vimy running northwest to Givenchy with hills 140 and 119 as conspicuous elevations.

Preparations for the great offensive were completed by September 24. Specifically the British were to capture Auchy, Haisnes, Pit No. 8, and the Hohenzollern Redoubt; further south the ridge between Hulluch was to be the objective, involving the capture of Loos, and Hill 70 to the east of the town. The French, as stated, were to attack the Vimy Heights. Amply provided with artillery, the British besides were to employ, for the first time, a gas that stupefied but did not kill. The action opened with artillery preparation on the 24th. During this day the entire German position within range was taken under fire by both the French and the British artillery. On the 25th this fire was renewed very early in the morning, and suspended two hours later in order to allow the infantry to advance. This they did at 6.30 A.M. The French, however, continued the artillery preparation until noon. On the extreme left, between the canal and Pit No. 8, the British met with a serious repulse. Part of the Hohenzollern Redoubt was carried, so was Pit No. 8. Haisnes was taken as early as 8 A.M., but had to be abandoned by 5 P.M. Loos, after a terrible struggle, fell to the English, as did Hill No. 70. A counter-attack by the Germans recovered most of Hill

70. As night fell, the British line ran around the south of Loos to the western part of Hill 70, past the west of Hulluch quarries to Pit No. 8, then east of Hohenzollern Redoubt, and so back to the original position. The fighting was renewed the next day with no material results on either side. By night the line ran back from Hill 70 to the Loos-La Bassée road, then north along this road, then northeast of Hulluch. The remainder of the line was unchanged. On the 27th the Germans recaptured Pit No. 8 and forced their enemies back to the eastern part of Hohenzollern Redoubt. The next few days were filled with desperate fighting, more or less localized. The net result, so far as the British were concerned, was the capture of Loos and a portion of Hill 70.

The French, on their side, advancing a little after 12 o'clock noon, had made but slight progress. They took the Souchez cemetery, but lost it later, and reached the lower slopes of Hill 119. The German garrison of Souchez retired to Hill 119. On the 28th Vimy Heights were attacked; the western slopes and a large part of the wood of Givenchy were taken.

This battle must be regarded as a failure on the part of the Allies. It would seem that the British had no reserves available to clinch the results obtained in their advance. The Germans thus had time to rally and counterattack. It would seem too that the French perhaps made a mistake in delaying their advance on the 25th by six hours. Had they moved out at the same time, the French left and the British right might have joined hands. The Allies' losses were very heavy. The British alone lost 50,000 men in this battle. Disappointed, however, as were the Allies in respect of the main purpose they had in view, both in Champagne and in Artois, they had, nevertheless, made some real gains. In the latter regions they were gradually pushing the Germans to the rim of the plain of the Scheldt. The British gain had, as it were, pushed a salient in between La Bassée on the north and Lens on the south, thus creating in some sort two German salients.

After the battle the French relieved the British from the French left up to and including the village of Loos and a part of Hill 70. The position of the Allies in this new salient of Loos was none too secure. But apart from this, it was clearly incumbent on the Germans to try to recover the terrain they had just lost. They accordingly, on September 29, attacked the northwest face of the British salient, but were beaten off. The French on their side advanced to Hill 140. The next day the German attempts on the northwest face were renewed. October 1 the French made more progress on Vimy Heights. October 3 was marked by a fresh attack on the northwestern face, and most of the Hohenzollern Redoubt was recaptured. On the 8th a counter-attack was made on the British position. It was repulsed with loss, as were the attempts made on the French near Neuville St. Vaast. Later, October 13, these attempts on the French were renewed with very much the same results. On this day the British themselves took the offensive in an effort to extend the northern face of their salient. This effort very nearly succeeded in gaining the Hohenzollern Redoubt for the English, a part of which only was held, however. October 19 the British line ran from Auchez-Hohenzollern, St. Elie, and then, so as to encircle Loos on the east and south, back to the old trenches.

The close of the year 1915 saw the adversaries confronting one another on this as on other portions of the front. But in respect of the northern region it must be remarked that unsuccessful as the Anglo-French efforts to break through had proved, yet they had succeeded in pushing back the Germans to the last ridge of hills separating the area of conflict from the plain of the Scheldt. One more drive like the September one, and the Germans might be pushed into the plain and so lose this part of France. Hence they reinforced their hold by reinforcements estimated at 600,000, and throughout the winter obtained a few minor successes.

Verdun.—But these, as well as all the other events, gave way in February, 1916, to the most determined attempt yet made by any of the combatants on any front to win a decision. On the 21st of this month the Germans opened their assault on Verdun. But this place had changed its character since the opening days of the war. Warned by the fate of Liège, Namur, and Maubeuge, it had passed from the condition of fortress pure and simple to that of fortress related to an army in the field. Hence its reduction was no longer a matter of sufficient pounding by 42-centimeter guns. General Pétain* was summoned to conduct the offense.

The first German drive was delivered against the point of the Verdun salient by heavy columns, over a 7-mile front, from Consenvoye to Azannes. After a prolonged bombardment of heavy artillery—it is estimated that during the first four days no fewer than 2,000,000 shells were fired—these columns struck the French advanced lines, and at the end of a week had advanced 4 miles towards Verdun. The right, advancing along the Meuse, had reached Champneuville; the centre, after taking Beaumont, faced the ridge known as the Côte de Poivre; while the left, after capturing Ornes, threw itself against Fort Douaumont, the most northerly of the permanent forts of Verdun. After several costly repulses this fort was stormed and held by the 24th Brandenburg regiment.

The second phase of the attack shifts to the east. Pushed back to a line running west from Douaumont along the Côte de Poivre to the Meuse, the French now lost Mauheulle and Fresnes. From these points the Germans made their way across the Woëvre plain to the edge of the plateau on which the permanent forts are constructed, and advanced to Eix, about 5 miles from Verdun. The total gains so far amounted to over 100 square miles.

Operations in this sector culminated in assaults on the fort and the village of Vaux, 2 miles southeast of Fort Douaumont. From conflicting reports it would seem that the German infantry finally won the village, but failed to carry the fort and the slopes to the east.

The Germans now turned their attention to the territory west of the Meuse. Their advance east of the river had found its flank exposed to artillery fire from the west. Moreover, it might be possible to cut the western railroad communication of Verdun. Opening in this region on March 6 the Germans, after taking Forges and

* Henri Philippe Pétain, born in 1857; delivered notable lectures at the Ecole de Guerre, for which he was decorated by King Ferdinand of Bulgaria; at beginning of European War was colonel of the Thirty-third Regiment of Infantry at Arras; distinguished himself in the retreat from Charleroi to the Marne; promoted general of division; in command of an army corps took Carceny, breaking through the German front; in 1915 was in command of part of the "Iron Division" of Colonials in Artois and Champagne; given command of armies around Verdun.

Regnéville found further progress barred by two fortified heights—the Côte de l'Oie and Le Mort Homme, both over 800 feet high. On the lower hills between these points is the wood known as the Bois des Corbeaux, strengthened with entanglements and batteries. Here, finally, the Germans made some gains, so that their advance, some 2 miles south of Forges, brought their line into approximate alignment with their positions farther east, and threatened the French line, strongly posted on Le Mort Homme. Moreover, they had some success as far west as Mélancourt.

In the fifth week of the campaign the point of attack was shifted still farther west, about 3 miles beyond Le Mort Homme. On March 21 the wood northeast of Avocourt, and on the 22d Haucourt Hill, were captured. This left the French positions at Mélancourt and Béthincourt exposed. The greater part of Le Mort Homme, as well as the woods that flanked it, was now held by the Germans.

On the night of March 30 the town of Mélancourt was attacked from three sides, and at dawn carried. The Béthincourt position was thus rendered still more precarious, though the French had succeeded in retaking a small section of Avocourt Wood.

In the meanwhile Douaumont ridge and vicinity were first shelled and then attacked by infantry. A sudden attack gave the village of Vaux to the Germans. The next day Caillette Wood, between Vaux and Douaumont, was penetrated by a strong German attack, but the French first lines, about 300 meters south of Douaumont village, held against a German assault, in which the attack was made in successive waves of great strength.

The struggle over Caillette Wood, the first week in April, although severe, yields in interest to the operations now resumed west of the Meuse. On April 5 the Germans took Haucourt, half a mile southeast of Mélancourt. The withdrawal from Béthincourt was now rendered inevitable, and skillfully made on April 8, with small losses; the new French line was established a mile to the south. Still keeping the offensive and continuing to make gains in this sector, the Germans penetrated the French lines on hills 265 and 295 (near Le Mort Homme), and captured a mile and a quarter of French trenches on Termiten Hill. This latter gain marks substantial progress towards Hill 304, the key position of this whole region. An interesting and novel illustration of the future powers of air craft in actual battle was furnished at Côte de Poivre. As the Germans were bringing up a battery to shell this ridge an air squadron came up and dropped bombs on the battery from an altitude of less than 1000 feet. The first round of bombs killed 9 horses and 30 men, and wounded and frightened so many others that the guns had to be abandoned.

At the end of three months continuous fighting, the Verdun campaign had not reached a decisive issue. Whatever gains were made, however, were made by the Germans. Up to this time they had occupied about 150 square miles of territory, and approximately 30 villages. Their lines were shortened 10 miles (40 to 30) and they had pushed forward an average of about three miles.

On May 4, the Germans again renewed their offensive with increased ferocity. The main attack was again directed against Hill 304 which

dominated the ridge west of the Meuse. The German artillery preparation had been scarcely if ever equaled for rapidity and intensity of concentration. In one week the Teutons made seven attacks. Ultimately east of Hill 304, all the trenches and shelters were destroyed and then carried chiefly by means of poisonous gases. Despite this the hill itself could not be taken. They attacked Le Mort Homme from all sides and finally succeeded in establishing a foothold between it and Hill 304. They then attacked from a new angle and captured Cumières, a village close to the Meuse. A strong French counter attack only succeeded in recapturing a part of the village. The Germans made their farthest advance up to this time when, on May 30, attacking with fresh soldiers drawn from another quarter, they captured Caurette Wood on the east of Le Mort Homme. They now occupied the northern slope and positions well around on each side and threatened to cut the French off from their line of communications.

In the meanwhile the action on the east bank of the Meuse had been rapid. The French by a surprise attack captured Fort Douaumont on May 22, but were unable to maintain their position, inasmuch as the Germans recaptured it in ten days as well as Caillette Wood. Upwards of 2000 prisoners were taken by the German forces. On the east of Fort Vaux the Teutonic forces also made advances. It was surrounded on three sides and its fall was only a matter of a few days. A small garrison of 1000 men was left in the fort to defend it. By most courageous fighting this handful of men held the Germans at bay for five days. They were finally compelled to surrender on June 7.

In the latter part of June the Germans captured the village of Fleury which is only $2\frac{1}{2}$ miles northeast of Verdun. The French counter-attacked and won back a foothold in the village which they stubbornly maintained and thus offset to some extent the importance of the German victory. West of the Meuse, the efforts of the Germans seemed to be in vain at Avocourt, Cumières, and Hill 304, although they held almost all of Le Mort Homme. However they captured Thiaumont by assault on July 3, and held it until early August when they were driven out by the French. Then followed the spectacle of almost daily changes in possession of the work. It remained ultimately in the hands of the Germans.

The struggle for Verdun now became a deadlock, neither side being able to advance. The Germans were forced to withdraw some of their men from the Verdun front in order to reinforce their position on the Somme. This deadlock continued until the latter part of October, when the French regained in three hours what it had taken the Germans months of effort to attain. It was the most brilliant action of the whole Verdun campaign. General Nivelle planned his attack so that it would occur when the German lines were the weakest and thus have a greater chance of success. His artillery preparations were brief but of exceedingly great intensity. Then came the infantry attack on October 24. It advanced in four columns. The first was between Pepper Hill and Thiaumont Farm. This division advanced about a mile and carried Thiaumont Farm and Thiaumont Work and the Haudromont Quarries.

The second division was to take Hill 320 and the Caillette Wood. It carried both these positions by an irresistible rush. Although this was

all they were supposed to accomplish the commander decided to continue his push forward. Consequently they proceeded beyond the wood and surrounded the Douaumont Fort. The village of Douaumont on the west was captured and then a rush was made for the fort itself. The Prussian defenders refused to surrender and nearly every one of them was killed before the French completely occupied the work.

The third division advanced about half a mile, capturing the remainder of Vaux-Chapitre Wood and all of Fumin Wood. The fourth division pushed the Germans from Chenois and Laufée woods, captured Dambloup battery and encircled Vaux Fort on the east, south and west. After the failure of German counter attacks, the French began to finish the encircling of the fort on the next day. It fell on the night of November 1-2.

During the next six weeks there were scarcely any infantry engagements and the artillery actions which occurred were only of minor importance. On the 15th of December, however, General Nivelle executed another great coup. He attacked on a front of 6 miles after a three-day artillery preparation. He succeeded in penetrating the German front for a distance of nearly 2 miles, and according to a Paris report captured over 11,000 prisoners. Vacherauville, Louvemont, Chambrette Farm, Harcourt and Bezouvaux were taken. On the 16th and 17th new gains consolidated the French positions.

After this advance the Verdun front once again became quiet, each adversary watching the other and being content to remain on the defensive. After 10 months of heavy fighting the Verdun struggle was virtually over. In the last analysis it was a great French victory. The moral effects on the French troops and French nation can scarcely be estimated. As a reward for his heroic work at Verdun, General Nivelle was made commander in chief of all the French armies, succeeding General Joffre.

The purpose of the Germans in selecting Verdun as a point of attack gave rise to much discussion. The date of the attack was well chosen, in anticipation of a general Allied offensive on the western front, but Verdun itself had long ago ceased to be a fortress in the technical sense of the word. Hence the German effort falls into the same class as all others, whether German or Allied, to obtain a decision in the west. The effort made at Verdun might have produced better results if made nearer to Paris. Even if successful it would result, moral effect apart, in merely straightening the German lines (accompanied of course by a similar straightening on the French side), unless, indeed, it was believed that a real breach could be made, opening the way for a real advance into the heart of France. It is declared in some quarters that the determining condition of the selection was for political and dynastic reasons the need of a victory for the Crown Prince; and it is further declared that Von Hindenburg and Von Mackensen both opposed Verdun as the theatre of the new offensive. One thing stands out: the enormous losses of the Germans for the sake, so far, of a few square miles of French territory.

Campaign in Picardy.—The expected Allied offensive on the western front began in the last week of June by a continuous shelling of the German lines on the British front. The point chosen for the attack was at last seen to be the junction of the British and French lines near the Somme River.

The preparation for the advance was unique. The new mortars of the Allies were first concentrated on the first line trenches of the Germans. They were kept in that position for 10 minutes and then concentrated on the second line of trenches. While firing on these the Allied troops rushed out and easily took the first line. In many cases the trenches were completely destroyed, and the attackers in some instances swept on to the second and third lines. Another unique thing about the battle on this front was the institution of the trench-raiding system, after prolonged shelling. At night a raiding party would rush into an enemy trench and would abandon it as soon as the occupants were bombed or captured. This was also important as a method of finding out the effectiveness of the artillery firing.

The objective of this campaign was the capture of Bapaume and Péronne. The British were to take the former and the French the latter. By the end of the first week the French had advanced about 4 miles and had captured Curul, Estrées and Heur. They took about 800 prisoners. During the same week the British advanced about 2 miles and captured La Boisselle, Thiepval, and Contalmaison. They took about 6000 prisoners. It was apparently the plan of campaign for the French and British armies to advance *pari passu*, inasmuch as in the second week the French just held the positions won and waited for the British to come abreast of them. The British captured Trones Wood for the second time on July 11, and again took Mametz Wood on the next day. On the 15th they captured the village of Pozières and 2000 prisoners. In the meantime the French had advanced eastward and captured Biaches, only 2 miles from Péronne. They had also taken Hill 97, the highest land in the neighborhood and a position which controlled the Somme valley for some distance. The latter part of July saw the French positions consolidated and the British firmly entrenched in Pozières.

In the first week of August the British and Australian troops advanced from their trenches north of Pozières and captured the top of a crest which overlooks Courcellette and Martinpuich. This gave them a direct outlook on their immediate objective Bapaume, which was 6 miles distant over a stretch of rolling country. On August 8 a combined French and British offensive made important gains towards Guillemont, west of Combles. The result was a gain of from 300 to 500 yards on a front of about 4 miles. German counter attacks with the aid of liquid fire succeeded in taking 50 yards of trenches from the Australians northwest of Pozières.

The next Allied advance occurred north of the Somme. The French moved forward from a point opposite Hardecourt (where they joined the British) to the Somme. The advance stopped. The pushing in of this wedge placed Cléry and Guillemont in a pocket. Northwest of Pozières the British, on the 14th, advanced about 350 yards on a front of approximately a mile, while the French further strengthened their position on Hill 109. On the 16th the French made substantial gains north of Maurepas and also south of that town, between it and Santerre. The efforts of the French in driving eastward toward Guillemont, Cléry and Maurepas seemed to indicate that they were going to try to approach Péronne from the north rather than to expose themselves to a frontal attack.

On the 24th Maurepas fell and the French pushed several hundred yards beyond on a 1¼ mile front. This left Cléry almost completely surrounded and left the French in front of Combles, an important railroad centre. The British advanced 300 yards south of Thiepval and put this town in a similar position to that of Cléry. The month ended with the British seizing ground between Guillemont and Ginchy. Strong German counter attacks had been repulsed all along the line.

During the month of September Combles and Thiepval were captured by the French and British respectively. The French salient between Ginchy and Cléry was deepened by the capture of several small villages. The result was that the new French lines were established on the outskirts of Combles. Then south of the Somme a great effort on the part of the French succeeded in capturing Berny, Soyecourt, almost all of Vermandovillers, Chilly and about 2 miles of the railroad running from Roye to Chaumes. During the second week the British thrust out west of Combles and succeeded in taking the entire village of Ginchy. The British lines were now within a few hundred yards of Combles. Taking advantage of this thrust, the French prepared to complete the pocket around Combles. After a heavy artillery preparation, the infantry advanced on the 12th. They advanced a distance of about 2 miles and gained the Peronne-Bapaume road just south of Rancourt. The next day they captured Bouchavesnes and Hill 76. On the 16th and 17th the Allied armies stormed German positions over 4 miles in length. In this advance the British captured the famous "Danube Trench." They also captured the almost impregnable Mouquet Farm which had been the scene of several hard struggles.

On the 20th the Germans made strong counter attacks in order to regain the ground lost to the French north of the Somme. They attacked on a three-mile front for a period of almost 10 hours but were everywhere repulsed.

On the 25th, another great forward movement of the Allies began and resulted in victories on a front almost 15 miles long. The British captured the villages of Morval and Lesbœufs, north of Combles. The French took Rancourt and went right up to the village of Fregicourt. These two movements completely cut off all means of escape from Combles. On the 26th it was taken. The British swept in from the north and the French from the south. A large quantity of war supplies fell to the victors. The British also took Thiepval which was of even greater importance than the taking of Combles, because it had checked them ever since the campaign began. Not content with these gains the Allies pushed on. The British captured a very strong redoubt northeast of Thiepval and were now less than 3 miles from Bapaume. The French advanced east of Rancourt and also entered the Saint Pierre Vast Wood east of Fregicourt.

The first week in October saw a comparative lull in the battle on the Somme. The British and the French made some small advances but seemed to be resting up for a renewed effort. This began on October 7. The Allies by a concerted movement pushed forward over half a mile on an eight-mile front. The British captured Le Sars. The French, breaking through the German Morval-Bouchavesnes trenches, pushed their line to the top of Saily-Saillisel ridge and were right at the entrance to the village of Saily.

South of the Somme the French occupied the village of Bovent on the 10th, and also took a large part of Chaumes Wood. In the next two weeks the Allies extended their lines up to the village of Le Transloy and the French gained a foothold in the village of Saily-Saillisel.

On October 30 the Germans began strong counter attacks. They succeeded in driving the Allies out of part of La Maisonnette and took several hundred prisoners as well as several lines of trenches. The positions gained were the most threatening to Péronne held by the French. The heavy fighting was done by German troops which had been withdrawn from the Verdun front.

In November it appeared that the Allied offensive had spent itself without accomplishing its objective. The heaviest fighting was in the Ancre Brook region, at the northern end of the Somme battle front. Before this operation took place the French had succeeded in tightening their hold on the Le Transloy region and in taking the greater portion of Saillisel. They also captured Ablaincourt, Ablaincourt Cemetery and Pressoire. On the 11th they took the rest of Saillisel. On the 13th began the great drive in the Ancre region. By a surprise attack the British penetrated the whole German front. On the 14th they advanced up the Ancre valley and captured the village of Beaucourt. This gave them a position overlooking Bapaume and straightened out a salient which threatened their lines in this region. Strong German counter attacks in the vicinity of Pressoire resulted in the retaking of part of that village. On the 16th the French counterattacked and succeeded in regaining these positions.

During the months of December, 1916, and January, 1917, the positions on the Somme front remained practically the same. The days were broken by skirmishes and artillery duels and the nights by trench raids, but the extremely cold weather, the fog and enormous shell holes filled with water made any real advances out of the question. Another unique feature of the Somme battle ought to be mentioned here. It was the use by the Allies of great armored tractors. They were carried along on giant caterpillar wheels and could go right over trenches and shell holes without having their progress impeded. They were armed with machine guns and wrought considerable havoc, especially where the ground was anyway level.

The new Allied attack in the west was part of a general plan whereby the Allies attacking simultaneously on all fronts—France, Russia, Italy—hoped to deprive the Central Powers of the advantage they hitherto derived from their interior position of being able to move troops quickly from one threatened position to another. The success achieved in the early part of the new offensive proved the soundness of this plan.

Continuation of the Campaign in Picardy (Battle of the Somme).—During the month of December the Allied army devoted almost its entire energies to the improvement of its positions. New trenches were built and the old ones improved. Roads and other means of communications behind them were put in the highest state of efficiency. When the weather permitted further operations the first British object was to drive the Germans from the remainder of the Beaumont Hamel Spur and the Beaucourt Valley. By the end of January, as a result of a series of minor operations, the high ground

north and east of Beaumont Hamel was occupied and they had pushed across the Beaucourt Valley and had gained a footing on the southern slopes to the west.

The possession of this spur gave the British complete artillery control of the Beaucourt Valley and the western slope. The capture of German trenches on the western slope on the night of February 3-4 made the German hold on Grandecourt and the positions west of that place and south of the Ancre Valley very uncertain. The result was that these positions were abandoned and Grandecourt was occupied on February 7.

The British High Command now devised a scheme to carry its line along the spur which runs northward from the Morval-Thiepval ridge about Courcellette and so gain possession of the high ground at its northern extremity. If this were successful it would bring into view hostile batteries in the upper Ancre Valley and would command the approaches to Miraumont on the west. These two attacks were executed on the night of February 17, and continued the next day. The fighting was severe and fraught with counter attacks. The British plans succeeded nevertheless, with the result that, after a heavy bombardment the villages of Pys, Miraumont and Serre were found to be evacuated and were occupied.

The capture of Puisieux-au-Mont on February 27-28 and the villages of Le Barque, Ligny-Thilloy and Thilloy on March 2, had driven the Germans back to the Le Transloy-Loupard line with the exception of the salient formed by the village of Irles. This was taken by assault on March 10. The Le Transloy-Loupard line was now so heavily bombarded that the Germans were compelled to retire to a parallel system of trenches on the other side of the village.

The German Withdrawal.—General Haig in his report on May 31, 1917, stated that for some time previous to the middle of March observations seemed to indicate that the area of German withdrawal would be greater than the one described above. It was learned that the Germans were preparing a new defensive line called the "Hindenburg Line," which branches off from the original line at Arras, ran southeastward to Queant and then passed west of Cambrai toward Saint Quentin. Hindenburg apparently feared the salient between Le Transloy and Arras which became more difficult to hold as the British pushed up the Ancre Valley.

On March 14, it was discovered that practically all the German first line trenches before St. Pierre Vast Wood had been evacuated. About the same time it was discovered that the German forces south of the Somme had been greatly weakened. As a result of these observations, the British and French High Commands ordered a general advance for March 17. By the evening of the same day Chaumes and Bapaume had been captured. These were defended by machine guns and infantry left to cover the retreat. On March 18, Péronne was taken by the British in conjunction with the French. By March 20, the British had crossed the Somme River in large numbers and had established a line from south of Germaine, where they joined the French, through Haycourt to Bus. This movement necessitated hasty building of bridges across the Somme. All the old bridges had been destroyed by the retreating Germans. Northeast of Bapaume, Morchies had been occupied.

The Allied advance continued, meeting with little opposition, so that by the first week in April, the British were established on a line running through Selency, Jeancourt, Epehy, Ryaulcourt, Doignies, Mercatel, and Beaurains. This line brought the British and French into contact with the "Hindenburg Line" from Arras to Saint Quentin. This withdrawal on the part of the Germans returned to France approximately 1500 square miles of territory. It was the first time since trench warfare had started that cavalry and large bodies of troops had participated in an open battle. The retreating Germans had completely devastated the country as they withdrew. Roads, railways, and bridges were systematically destroyed. Houses, wells, and orchards were blown up with dynamite. Not a thing was left which could be of the least value to the advancing armies.

Battle of Arras.—One of the reasons for the German withdrawal was to nullify any preparations the Allies had made for a spring offensive. This object failed of realization when scarcely a week later the British began an offensive on a 12-mile front north and south of Arras. The battle gradually extended to an offensive over the whole line from Arras to Saint Quentin. The heaviest fighting was done on a line extending from Givenchy, southwest of Lens to Henin southeast of Arras. This line has commonly been called the hinge on which Hindenburg swung his retreat after the battle of the Somme. A four-day artillery preparation of almost unprecedented violence paved the way for the advance. On the first day of the battle, Canadian troops stormed Vimy Ridge, the top of which was literally blown off by the artillery. Four thousand prisoners and large quantities of war material were captured here. On April the British advanced to the outskirts of Monchy-le-Preux, which threatened Monchy and the entire Arras-Cambrai road. On April 11, Monchy fell and on the next day Wancourt and Heninel did likewise.

On April 13, the battle took an entirely new turn. Sweeping northward from their new positions east of Arras the British drove the Germans back on a 12-mile front, capturing six villages and seriously threatening the coal city of Lens. On the 14th the British pushed closer to Lens and on the 15th entered the outskirts of the city itself. For several days no further progress was made because of severe artillery duels, violent counter attacks, and consolidation of positions.

On April 24, the British pushed forward east of Monchy and the next day advanced south of the Scarpe River. Three days later they broke the "Oppy Line," a switch of the Hindenburg line, by the capture of Arleux-en-Gohelle. They also occupied a part of Oppy village (29th), but were compelled to retire from it in the face of heavy artillery fire. On May 3, the British took Fresnoy and part of Bullecourt, but were later forced to give them up on account of heavy counter attacks. It may help to realize the fierceness of the fighting when it is stated that Gavrelle changed hands eight times in one day. The British reentered Bullecourt on May 12, and also took part of Rœux. In the next three days these positions changed hands three times, with the Germans having the better of the counter attacks.

The battle of Arras had now practically come to a standstill. In the first two weeks of June the British were driven back east of Loos, from



Bullecourt and east of Monchy-le-Preux. The Germans had lost 15,000 prisoners and nearly 200 guns. The total effects of the battle of Arras was the placing of Lens in a pocket, the mouth of which was ever growing smaller. This city was a nest of machine guns and all the houses had been leveled so that the German artillery might get a full sweep. The British suddenly shifted their operations to the Ypres sector. (See below).

Aisne Offensive (April, 1917). The French pursuit of the Germans after their great retirement was very rapid. Their advance was directed toward La Fère. Without any serious opposition the French reached Tergnier, 2 miles from La Fère. Further south, however, the French struck a snag in the Ailette River which protected the forests of Coucy and St. Gobain. They succeeded in crossing the river and capturing the village of Coucy, but were unsuccessful in their attempts to capture the forest of St. Gobain, which was one of the main defenses of the Hindenburg line. Moving their line eastward the French pushed the Germans back along the Oise River and thus threatened the German hold on St. Quentin. In the meantime the British had thrown a semi-circle around St. Quentin on the north and west of the town so that the artillery controlled the approaches to it. All attempts on the part of the Allies to take the city failed, however.

On April 16, the French launched a great offensive on the Aisne River. They attacked on a 25-mile front from Soissons to Rheims. The Germans had held this line since their retreat from the Marne. For 10 days French artillery had prepared for the offensive and for a similar length of time the Germans had been bringing up great quantities of men and guns to meet the expected attack. A successful attack by the French would threaten the important city of Laon. On the first day the entire German positions on the front line were taken along with 10,000 prisoners. By the end of the third day the French had taken 17,000 prisoners and 75 guns. The villages of Chavonne, Chivy, Ostel, and Braye-en-Laonnois were captured. Further west on the southern bank of the Aisne the French captured all of Vailly and an important bridgehead. Hindenburg brought up thousands of fresh troops and on April 19, delivered one of the strongest counter attacks of the entire war between Juvincourt and Berry-au-Bac, but they were thrown back in disorder after furious fighting. On the same day the French advanced on the eastern end of the battle front in western Champagne and threatened the town of Moronvillers.

On April 20, the French pressed the Germans back toward the Chemin des Dames, an important road running along the top of the heights north of the Aisne River. In this sector Malmaison fort protecting the road from Soissons to Laon prevented further French advances. For the next 10 days there were severe artillery duels and numerous local engagements and counter attacks, with the advantage usually with the French. The terrain of the Aisne territory was peculiar. It consisted of limestone cliffs, which were honeycombed with natural and artificial caverns, which were practically immune to French artillery fire. This necessitated fierce hand to hand struggles, sometimes far underground.

On May 4, Craonne and several strong points

north and east of it, as well as the German first-line positions on a front 2½ miles northwest of Rheims were taken by the French. Craonne is on the southern end of the Chemin des Dames ridge. Counter attacks of unprecedented violence failed to shake the French grip on the Ladies' Road (so called because it was built by Louis XV as a promenade for his daughters). They gradually pushed ahead from the eastern and western slopes until they controlled the entire road and thus overlooked the Ailette River and valley from which the heights of Laon rise. Almost ceaseless counter attacks were made against the newly won French positions but completely failed, despite temporary local successes. The French completed their operations by driving the Germans across the Ailette River (October, 1917), and then turned their energies to the Battle of Flanders (see below).

French Success at Verdun.—On Aug. 20, 1917, after nine months of comparative quiet the French resumed the offensive at Verdun. After a three-day bombardment they advanced on both sides of the Meuse and penetrated a mile and a quarter on an 11-mile front. They captured Avocourt Wood, Le Mort Homme, Corbeaux and Cumieres woods, Côte de Talou, Chapneville, Mormont farm, Hill 240 and 4000 prisoners. In the next four days smashing blows were delivered which resulted in the capture of Regnéville, Samogneux, Côte de l'Oie and 15,000 prisoners. By the 15th of September the French had recovered 100 square miles of the 120 the Germans had seized in their great offensive. They now held all the dominating positions in the Verdun sector and strong German counter attacks failed to dislodge them.

Battle of Flanders.—On June 7, 1917, occurred one of the most spectacular battles of the entire war, that for the Messines-Wytschaete ridge. This ridge formed a salient which dominated the entire Ypres sector and which was literally a thorn in the side of the Allies. For over two years British sappers had been burrowing under this ridge and finally succeeded in placing in position, undetected by the Germans, 19 mines containing more than 1,000,000 pounds of ammonite. These were exploded by electricity on the morning of June 7. It was like a tremendous earthquake. The whole tops of the hills were blown off and the roar could be heard for a distance of 150 miles. A tremendous shell fire which had been playing on the ridge for two weeks reached its greatest intensity as the mines were exploded. After the explosion the British infantry rushed forward and by the end of the day had wiped out the entire salient. Seven thousand prisoners and many guns were taken with relatively small losses to the attackers. Even the rear protecting positions were taken. The attack was on a 5-mile front and penetrated to a depth of 3 miles.

The Germans retaliated for this Allied success by a successful attack on the Allied line at its most northern extremity in Belgium. On July 11, after strong artillery preparation, the Germans made a strong infantry attack on the British positions east of the Yser River. The British line at this point was about 600 yards east of the river. Their entire lines of communication had to cross the river to supply the first-line trenches. The Germans completely destroyed the lines of approach and captured or killed the entire British force east of the river (about 3000). Twelve hundred prisoners were taken.

The reduction of the Messines-Wytschaete salient prepared the way for further Allied activities in the Ypres sector. Consequently, on July 31, 1917, the British and French began an offensive which lasted intermittently down to the beginning of 1918, when weather conditions forced a halt. The objects of this offensive were to compel the Germans to give up their submarine bases at Ostend and Zeebrugge and to envelope the important industrial centre of Lille. For three weeks previous to the above date, the artillery preparations on both sides had been stupendous. The infantry attack was on a 20-mile front from Dixmude to Warneton. The first attack passed the German third-line trenches. On August 1, a severe rainstorm lasting 50 hours began, and perforce held up further operations. On August 10, Westhoek village and ridge were carried by storm. The French took Bixchoote. The next day the British attacked in Glencorse Wood. The artillery battle reached heights never before attained. Both sides seemed to have unlimited supplies of ammunition. The German and Allied barrage fires were wonderful to watch. On one occasion five distinct British barrages were counted. The Germans devised on this front a new method of defense. The trench system was practically given up and concrete redoubts, called by the British "pillboxes" were erected in the shell holes. They were nests of machine guns and were often invisible to airplanes. This did away with the necessity of keeping great quantities of troops in the forward trenches and allowed the advance lines to be held by scattered forces. The terrain was also peculiar. The heavy torrents of rain made the flat ground a veritable quagmire. The infantry sank up to their knees in mud and it was almost impossible to bring up heavy artillery.

On August 16 the Allies struck again on a 9-mile front north and east of Ypres and carried practically all their objectives. On the left the French drove the Germans from the salient between the Yser Canal and Martjevaart and captured the bridgehead at Dreigrachten. In the centre the British captured the strongly fortified position of Langemarck and pushed forward for another mile. On the right the British failed to capture the high ground almost due east of Ypres. They seized it in their first assault but were compelled to give it up. Weather conditions prevented any further operations for an entire month.

From the middle of September to the middle of October five brutal assaults by the Allies made a great salient into the enemy positions. On September 20, an attack began on an 8-mile front between the Ypres-Comines canal and the Ypres-Staden railway. This resulted in the capture of Inverness Copse, Glencourse Wood, Nonne Boshen, Potsdam Vampir, Iberian farm, and Gallipoli. All of these places were named by the Allied troops in front of them. In the centre Veldhoek and part of Polygon Wood were taken. All of these gains were consolidated. On September 26 came another great smash at the German lines. Driving on a 6-mile front, Tower Hamlets Spur, the remainder of Polygon Wood and Zonnebeke were taken. The advance was approximately $\frac{1}{2}$ mile. On October 4, the Allies again attacked on an 8-mile front. The British gained control of the Passchendaele ridge (their immediate object in the Flanders battle) as far as Broodseinde. The weather

prevented any further attacks or counter attacks. On the 9th, a fourth concerted blow captured St. Jean de Mangelaere and Poelcappelle. On the 12th, another attack, interrupted by the weather, brought the Allies up to within 500 yards of the town of Passchendaele. These five blows captured an area of approximately 23 square miles and carried the Allies to the Ypres-Roulers road on the northeast as well as an advance of a mile over the Ypres-Menin road. Roulers was now in the range of the heavy artillery, which was also able to sweep the Flanders plain. The losses of the Allies were comparatively slight.

After a brief lull the Battle of Flanders was continued on October 22. On that day the British and French advanced on both sides of the Ypres-Staden railroad. The French secured the southern part of Houthoult Forest and a number of fortified farms. The 26th saw another big advance in the same direction. The British advanced west of Passchendaele and north of Gheluvelt, while the French took Draebank and several more fortified farms. On the 28th the French and part of the reorganized Belgian army captured the Mercken peninsula (formed by canals on three sides) south of Dixmude. On the 30th the British advanced from the positions won by them on the 26th and captured most of Passchendaele, but were compelled to retire in the face of heavy counter attacks. A week later after heavy bombardment, the Canadians advanced, took the town and continued 800 yards beyond it. Furious German counter attacks in the next few days failed to penetrate the new British line. The British then proceeded to clear the rest of the spur by advancing northwest of the town. They were now within 5 miles of Roulers. The entire Ypres front remained practically the same until the beginning of 1918. The British efforts were turned to the battle that developed at Cambrai and the Belgian front was the scene of heavy artillery duels and trench raids carried out to relieve the pressure on the Cambrai front.

Battle around Cambrai.—On Nov. 21, 1917, began one of the greatest battles of the year in the region around Cambrai. For a time it appeared as if the British were going to smash the Hindenburg line to pieces. Then the Germans started a counter offensive which almost nullified the British gains. The battle was a surprise attack without artillery preparation, a method practically unheard of in the present war. The attack was on a 35-mile front between St. Quentin and the Scarpe River, although the main part of it was due west of Cambrai. Huge "tanks" screened by smoke led the advance and plunged through the German defenses as though they were paper. The first day netted 5 miles, 8000 prisoners and a number of guns. General Julian H. G. Byng was in direct command of the operations. The villages of Benavis, La Vacquerie, Ribecourt, Havrincourt, Marcoing, Graincourt, Anneux, and Noyelles-sur-l'Escaut were captured as well as several forests and fortified farms. Part of Bourlon Wood, the dominating height around Cambrai, and part of Bullecourt were also taken. The village of Fontaine Notre Dame, $\frac{3}{4}$ of a mile from Cambrai, was captured but the Germans retook it the next day. Open fighting prevailed and the cavalry played a big part in the British advance.

On November 23 the British attack was re-

newed and a bitter struggle ensued in the neighborhood of Mœuvres (south of Bourlon Wood) and at Crèvecoeur, south of Cambrai. The British took a hill dominating the former position. Cambrai was under British shell fire and Queant was in serious danger. Bourlon Wood and village changed hands several times. The Germans made tremendous efforts to hold these dominating positions, but the British held on to them tenaciously until encircled by German troops and finally driven out of the village. Cambrai was heavily shelled from the Bourlon Wood.

On November 30 the Germans began a grand counter offensive on a 16-mile front on the north, south, and east sides of the British wedge. On the north and east they failed to gain, but on the south they reached La Vacquerie and Gouzeaucourt taken by the British on the first day of their offensive. On December 2, after ten attacks the Germans occupied Masnières. The German reports stated that 6000 prisoners and 100 guns had been taken by them up to Dec. 4.

The success of the German counter drive on the south compelled the British to rectify their line on the eastern side. Consequently they withdrew from Bourlon Wood and gave up Noyelle-sur-l'Escaut, Anneux, Cantaing, Graincourt, and Marcoing. Approximately one-half of the territory gained by the British was regained by the Germans. American engineers, working behind the British lines, were caught when the Germans broke through. They seized guns from fallen soldiers and fought valiantly. Several lost their lives.

The entire western front was now alive with artillery action from the sea to Switzerland. All the European newspapers predicted a big drive "somewhere on the front." A furious attack west of Cambrai on December 13 was repulsed by the British. The Germans attacked between Bullecourt and Queant (10 miles) in mass formation but were unable to break through. The line on the entire front was the same at the beginning of 1918, because winter put an end to any further operations.

Allied Unity.—The prime ministers of France, Italy, and Great Britain met at Rapallo, Italy, on November 9 and formed the Supreme War Council, which was to coördinate the military powers of the Allies and wage war as a unified group and not as individuals. The members of the Supreme War Staff were to be Generals Cadorna (Italy), Foch (France), and Wilson (British). According to the agreement, "The Supreme War Council has for its mission to watch over the general conduct of the war. It prepares recommendations for the considerations of the governments and keeps itself informed of the execution and reports thereon to the respective governments."

On November 7, 1917, a United States Commission headed by Colonel E. M. House arrived in London to consult with the Allies. Secretary of State Lansing announced that the object of the mission was "a more complete coördination of the activities of the various nations engaged in the conflict and a more comprehensive understanding of their respective needs, in order that the co-belligerents may attain the highest efficiency. He strongly emphasized the fact that it was a war and not a peace conference. Most of the other Allies sent representatives with the same objects in view. President Wilson cabled to Colonel House that "unity of plan

and control" were essential and he told him to attend the first meeting of the Supreme War Council. Colonel House returned in late December, and urged the hasty despatch of American forces to Europe, as well as the speeding up of shipbuilding, and the securing of Allied unity.

American Expeditionary Force.—The first contingents of a United States Army to fight in Europe arrived at a French port on June 26-27, 1917. They were commanded by Major-General William L. Sibert and received a tremendous ovation from the French people. The transports on the way over had been unsuccessfully attacked twice by submarines. Gen. John J. Pershing, the Commander-in-Chief of the American force had been in France for some time preparing for the coming of the "Sammies" as the French characterized the American soldiers.

Training camps for the American troops had been located in various parts of France and were ready for occupancy when the soldiers arrived. Infantry, artillery, aviation, and medical bases were established. The number of men gradually increased, many of them stopping in England before going over to France. An intensive system of training was entered upon during the latter part of July. The instructors were officers and men of the British and French armies. The American transportation service took over all railways leading to American bases and a section of French forest was turned over to American lumbermen to supply the needs of the expeditionary force.

The news that American forces were in action "somewhere in France" was given out in a dispatch on Oct. 27, 1917, which stated that the artillery had fired the first shot and that the infantry had entered the first-line trenches. The activities did not mean that American troops were taking over a section of trenches on the western front, but that they were completing their training under actual war conditions. A few nights later the Americans crept out into "No Man's Land" on reconnoitering expeditions. Every so often the troops in the trenches were changed so that as many troops as possible could get a taste of real war conditions. On November 3, the Germans announced the capture of American prisoners when a salient which they occupied was cut off from the main trenches by a barrage fire. The Americans lost 3 killed, 11 wounded, and 11 missing. Although no official announcement was made as to the exact location of the sector, a comparison of the various reports seemed to show that the region was in the Vosges Mountains where the Rhine-Marne Canal crosses the boundary line between France and Lorraine. During November and December, 1917, intermittent artillery duels and engagements between patrols occurred, but no conflict of any size developed.

III. Eastern Theatre. An unexpected blow by the Russians through East Prussia early in the war had almost upset the German plan, but for the superior generalship of Von Hindenburg (Tannenberg). Meanwhile the Austrian advance to hold the main Russian armies failed in the rout through Galicia, and October, 1914, found the Russians astride the Carpathians. To save the Austrians, Germany hurried troops from France and organized a counter-offensive through Poland, which developed during the winter and spring, 1914 and 1915, and drove the Russians far behind their own frontier.

Trench warfare marks this front during 1915-16 until June, 1916, when the Russians, finding Austria advancing in Italy and Germany engaged at Verdun, once more began a successful drive through Galicia that reacted on the Italian and Verdun fronts.

The detailed account of these military operations falls under the following heads: (1) Russian drive into East Prussia, outgeneraled by Hindenburg and culminating in defeat at Tannenberg; (2) Austrian advance through Galicia to cut the Kiev-Warsaw railroad; (3) defeat of this Austrian campaign and pursuit by the Russians to the Carpathians; (4) German advance in Poland, including first attack on Warsaw; (5) siege of Przemyśl; (6) Austro-German advance in Galicia, with rout of Russians, including loss of Poland, and taking up of intrenched line from Riga to Dvinsk to Lutsk and down to the outer Bukowina border; (7) Brusiloff's drive into Galicia, June, 1916. The struggle on the east front was conditioned by a number of circumstances. We have first the German plan itself, to smash the French and then turn upon the Russians before they could get ready. A corollary of this proposition was the retention on the east front of but few troops. Next we must take into account the fact that the Russians mobilized and were in readiness far faster than any one thought they possibly could. Lastly, and of paramount importance, is the nature of the terrain and its organization in view of war, and then the configuration of the frontier itself. The striking feature of this configuration is that Russian Poland projects like a huge bastion between Prussia on the north and Galicia on the south. The political frontier separating the contiguous states is, on the whole, not a military frontier. Hence Russian Poland lies peculiarly exposed to attack from the north, west, and south. On the German frontier of East Prussia lie the Masurian lakes, forming a natural obstacle to invasion either east or west. On the south, and some distance from the political frontier, stretches the Carpathian Range, the natural protection of Hungary. Through this great central plain run many rivers; chief of these are the Niemen in Courland and Kovno, and the Vistula roughly bisecting Russian Poland. In Germany the foresight of the general staff had furnished a complete network of railways, but in Russia and in Russian Poland there were comparatively few. The German frontier was protected by important fortresses—Königsberg, Graudenz, Thorn, Posen. In Russian Poland, besides the fortified capital, Warsaw, there were Novogeorgievsk, northwest of Warsaw, and Ivanogrod, southeast, and the line of fortresses along the Narew River terminating in Ossowiec (on the Bobr). East of Warsaw, at the junction of the railways from Petrograd and Kiev, lies Brest-Litovsk on the Bug. It stands on the western rim of a great stretch of almost impenetrable marshes, the Pripet Marshes.

Russia at once took the offensive. But it was plain that before she could advance, or attempt any great movement from her own domain of Poland, she would have to clear both East Prussia and Galicia of the Germans and Austrians respectively. The German idea apparently was to hold East Prussia and the remainder of the frontier to Galicia, while Austrian armies were to advance northwest into Poland, and eastward into Volhynia, and thus hold off or engage any Russian forces that might under-

take operations in this region. The Russian commander in chief was the Grand Duke Nicholas (q.v.), until superseded by the Czar (Nicholas II) in September, 1915.

Invasion of East Prussia.—Whatever the motives that induced the course, the Russians opened the campaign by an invasion of East Prussia. Three railways cross the frontier of this province—the main line Petrograd-Berlin, at Wirballen; the Bialystok-Lyck railway; and the Warsaw-Danzig, through Mława and Soldau. The Germans had made no effort to fortify their frontier save in so far as the great positions of Königsberg and Danzig may be said to have fortified it.

In August, 1914, at the outset of the war, the Russians sent in two armies, one from the Niemen, resting on the fortresses of Kovno and Grodno, under General Rennenkampf (q.v.), and the other from the Narew under Samsonoff, each of them about 250,000 strong. Rennenkampf was the first to come into contact with the Germans under Von François, who, seriously outnumbered, fell back after fighting delaying actions to Gumbinnen, where on August 20 after a stubborn resistance he was defeated. He retired on Insterburg, but made no attempt to hold the place, which was entered by the Russians on August 24. Rennenkampf now continued his advance west and southwest, clearing the country, and approached closely to Königsberg, without however really menacing that formidable fortress. Samsonoff, marching northward, found only inferior numbers to oppose him, engaging them at Soldau, Neidenburg, Allenstein, and Frankenau. The result of the campaign so far had been to drive the Germans out of a great part of East Prussia, where two armies, totaling nearly 500,000, were about to join hands. Samsonoff's army occupied the line Soldau-Alenstein-Frankenau while Rennenkampf's ran northwest-southeast along the line Friedland-Angerburg. The situation was serious for the Germans, who had left but few troops (5 corps of the active army) in this region of the theatre of war.

After their initial successes in East Prussia the Russians pushed their cavalry patrols almost to the lower reaches of the Vistula. It was even reported that they had begun the investment of Königsberg. Apart from sentimental reasons, the permanent retention by the Russians of East Prussia would have paralyzed German efforts in that region, and affected the whole course of the war in the East.

The business of clearing the country of the enemy was intrusted to Von Hindenburg, a retired general thoroughly acquainted with the topography of the region. His first task was to assemble an army, which he did from the troops that had retreated before the Russians, from part of Von François' army and from the Vistula fortresses. He thus got together some 150,000 men, with whom he advanced into East Prussia. The two Russian armies had in the meantime become separated, Rennenkampf going down the railway from Insterburg towards Königsberg, while Samsonoff had got as far west as Osterode, where lay his right with his left further south along the Soldau-Ortelsburg Railway. Far outnumbering Von Hindenburg, Samsonoff could derive no advantage from his superior strength because his troops were, so to say, tangled up in the lake-and-swamp region in which they had become involved.

Von Hindenburg stood with his left near Allenstein, across the Osterode-Insterburg railway, his centre near Gilgenburg, and his right at Soldau. With his front protected by the nature of the ground, the roads on his flanks gave him opportunity, should it be necessary, to pass troops around either flank. Having, on August 26, repulsed the Russian attacks, Hindenburg on his right forced the enemy back towards Neidenburg, and thus got control of the road to Mława. To meet this German effort, Samsonoff strengthened his left, and on the 27th tried to win back the road. In this he failed; his centre at the same time fell back. Meanwhile Hindenburg had been sending men by the thousands northeast, past Allenstein, to envelop the Russian right. On the 28th and 29th there was severe fighting for the possession of Passenheim, on the railway from Ortelburg to the main line, in which the Germans were successful. But one line of retreat was now open to the Russians, the road running east through Ortelburg towards Lyck, with the Germans well to the eastward of Passenheim. The Russians by this time had both their flanks turned and their centre driven in, and that by an army markedly inferior in numbers. Accordingly on the 30th the retreat began, and on the 31st the destruction of Samsonoff's army was complete. He was himself killed, 90,000, and possibly more, prisoners were taken, 30,000 or more killed and wounded, guns lost by the hundreds, and all sorts of stores abandoned. Samsonoff had marched into a trap and there been crushed by inferior numbers compensated by superior generalship, extreme mobility, freedom of movement, and control of communication. Barely more than one corps of the five composing the army managed to escape. See TANNENBERG.

The battle over, Hindenburg set out north-eastward. But *Rennenkampf* had fallen back towards the Niemen on hearing of Samsonoff's fate. He fought a rear-guard action at Gumbinnen, followed by more fighting at Augustowo, and retired behind the Niemen, September 23. Von Hindenburg tried the crossings, failed, was pursued by *Rennenkampf*, and after suffering severely in the Augustowo morasses (Oct. 1-9) was relieved to take command in Poland. In the meantime the centre of interest had shifted to Galicia.

Conquest of Galicia.—The German plan of campaign contemplated, as we have seen, the crushing of France, while Russia should be held by the Central Powers. In form, so far as Austria was concerned, this holding was to be an invasion of Russian Poland. South of the frontier two railways run roughly parallel to the boundary, and from these two run branch lines and feeders. The Russians were not nearly so well off in the matter of transportation. Given, therefore, the supposed slowness of Russia's mobilization and the poverty of her rail system, an invasion of Russian Poland seemed to be a promising undertaking. It would at any rate hold Russian forces in the region and thus prevent their coöperation with those invading East Prussia further north. The invasion was made by two armies, the first under General Dankl, of over 300,000 men, with its base on Przemyśl and Jarosław, and for its objective to push northeast to Lublin and Kholm, and cut and hold the Warsaw-Kiev railway. This done, Brest-Litovsk would be threatened and with it communication with Warsaw. To protect this army on the right

and rear, a second army under General von Auffenberg* was to advance northeast from Lemberg. This army mustered also probably 300,000 men. A third, or reserve army, under the Archduke Frederick, was sent forward on Dankl's left in the direction of Kielce. If with this offensive we couple a German offensive coming down from the north, and the possibility of troops from Silesia joining hands with the 3d Austrian army, it must be admitted that the plan of attack was not without merits. But as a matter of fact, the Russians by the end of August, 1914, had brought into Galicia from Kiev and Odessa armies totaling more than 1,000,000 men. They allowed Dankl to advance, practically unopposed, almost as far as Lublin. There was a battle at Krasnik, in which the Austrians were successful. The real Russian strength all this time was gathering behind Lublin and Kholm, where two armies under Ivanoff waited for the moment to strike. When September came, the Austrians found opposed to them, in this region, forces at least as great as their own.

In the meantime Von Auffenberg had pushed on to Tomaszów, his purpose being, as already stated, to guard Dankl's right. Contact was established August 11 at Brody, and two days later at Sokal, where the Russians were successful. On the 17th began the general advance against Austria. The commander in chief on this front was Ruzsky (2d army), assisted on his left by Brusiloff† (3d army), who between them had over 600,000 men. On discovering the strength in front of him, Von Auffenberg drew reinforcements from the reserve army. It is possible that on both sides there were not far from 1,200,000 men, with the advantage slightly in favor of the Russians.

On August 17 Ruzsky attacked Von Auffenberg. He crossed the frontier on the 22d, as did Brusiloff further south. On the 23d Brusiloff drove the Austrians out of Tarnopol; they fell back on the Złota Lipa, where they made a stand, but were finally beaten back in the direction of Halicz. Ruzsky in the meantime had been thrusting at the Austrian left and centre. The Austrians finally took up a strong position 70 or 80 miles long in front of Lemberg, and extending from Busk in the north to Halicz in the south. Here they were attacked on August 26-27 by Brusiloff and Ruzsky together, and beaten, their right having been turned at Halicz, and their left thrown back.

The result of this great battle was that Lemberg fell into Russian hands, and that the Austrians retired in disorder. The losses on both sides were very heavy. In prisoners, the Austrians are said to have lost 100,000. Lemberg, on account of its rail connections, was a valuable capture. On September 4, after the defeat of Von Auffenberg, the Russians opened on

* Moritz, Ritter von Auffenberg, born (1852) in Tropau, Silesia; became lieutenant (1871); field marshal (1905); Austro-Hungarian Minister of War (1911); general of infantry; commander of a corps at beginning of European War and won victory of Kamarów; retired soon after; accused of plot to sell military secrets to Russia and imprisoned at Spandau (1915).

† Alexei Alexeevitch Brusiloff, born (c. 1860) at Kutais in the Russian Caucasus; of a family long distinguished in Russian military and political life; educated at Tiflis and in a military school; gained a reputation for horsemanship and was chosen aid to General Sukhomlinov, then head of the Cavalry School for Officers at St. Petersburg; with Grand Duke Nicholas he witnessed the French army manoeuvres; rose to be general of brigade and of division, and after 1910 commanded an army corps, being stationed successively at Lublin, Warsaw, and Vinnitsa.

Dankl. There had been more or less fighting before this date in the region between the two Austrian armies, e.g., at Tomaszow, where the Austrians were seriously beaten; the Russian front Lublin-Kholm had itself been attacked, but without effect. Under the pressure of the Russians, Dankl was forced to fall back on a front of 75 or 80 miles, with the Vistula on his left, to the river San (September 12), a retreat that was a running fight between the Austrian rear and the Russian advance. This struggle developed into genuine engagements at various points, as at Krasnik.

Auffenberg, after Lemberg, took up another position, Grodek-Rawa-Ruska. He had been reinforced, and his position was strong. But, nevertheless, his left (Rawa-Ruska) was crushed, after a most gallant resistance lasting over a week, and when Grodek was carried (September 14) his defeat was complete. The Russians pushed on vigorously, captured Jaroslav (September 21), and drove the fragments of Auffenberg's army into the defenses of Przemyśl.

The passage of the San cost the Austrians very heavily in men, in supplies, and war material. A Russian force that had crossed the Vistula at Josefov marched up the left bank of that river, and reaching the San at the same time as the main body, defeated an Austrian force on this side and took Sandomierz.

The Russian campaign so far had been successful. Their victory at Tomaszow interposed them between the two Austrian armies. The defeat of the 2d had left the 1st in a serious situation, for which immediate retreat was the only remedy. This retreat was one succession of defeats. The general result was the crowding of the two armies into the region west of Przemyśl, leaving the Russians in control of eastern Galicia, with its railways and cities. Przemyśl itself was invested on September 26.

After their victories in east Galicia, the Russians by the beginning of October had crossed the three eastern passes of the Carpathians, and had advanced some distance toward Cracow, the possession of which would have wrought serious harm to the Central Powers. But the news of the offensive now forming against western Poland put a stop to these plans, and they fell back to the San.

First German Drive at Warsaw.—If, as has been noted, it was the German expectation that the Austrians would hold the Russians in Poland, and thus leave Germany free to throw her full weight on France, the Galician campaign must have proved a rude awakening. In spite of Tannenberg, East Prussia had again been invaded, and in the south Cracow would be the next objective of the Russians. But if Poland could be attacked directly and its great fortresses captured, the Central Powers would be in a position to menace the flanks of the Russian armies, and by seizing their communications force them to withdraw. And at any rate it was time to do something to check the Russians, whose efficiency had been as greatly underestimated as their victories had been unexpected. Accordingly the Central Empires opened their first offensive against Warsaw (September 27) with Von Hindenburg (a few days later) in command of the Austro-German forces. Four separate armies advanced—one from Thorn up the Vistula, another from Kalisch towards Lodz, and a third from Breslau towards Novo-Radomsk, the fourth from Cracow towards

Kielce. These four armies numbered probably about 1,500,000 men, of whom two-thirds were Germans. The advance was rapid. On October 8 Lodz was occupied, by the 11th contact made with the Russians at Skierniewice. The southernmost army was on October 13 engaged in the neighborhood of Ivangorod. By the middle of the month the Germans were almost within siege-gun range of Warsaw. That city on the north was well protected by the Vistula and the Narew with their fortresses, but the Germans had turned, so to say, the position by advancing from the south and west. Apparently the Russians had not contemplated the possibility of the offensive now developing, and had made no adequate preparations to defend Warsaw. At any rate the northern army (Von Mackensen*) greatly outnumbered the Russians available for its defense. In fact there were but few Russians in central Poland. We have then by the 9th of October the following situation: an army at the gates of Warsaw, two others to the west to face any eventuality, and a fourth covering Ivangorod. Warsaw apparently was doomed, and possibly with it the whole of Poland. Such troops as held Warsaw were having the worst of it. But on the 18th Russian reinforcements appeared, and increased on the succeeding days. They crossed the Vistula at Novogeorgievsk, and advanced upon the Germans, who on the 21st were in retreat. Before withdrawing, however, they resisted strongly, but their left was turned at Sochaczew. The Germans succeeded in crossing at Josefov, but were annihilated on the 21st. At Ivangorod the Russians crossed the river (October 20-22) to the western bank, attacked the Austrian right, and after several days' fighting forced their entire army to retreat to Radom, which place, with Lodz, was reoccupied. At Kielce the Austrians on November 3 were severely beaten. The main German armies, after heavy fighting around Rawa, Skierniewice, and Lowicz, continued their retreat, and early in November were once more across their own frontier.

Second Offensive in Galicia.—At the same time with the main offensive in Poland the Austrian forces in Galicia, composed in part of Auffenberg's original army and in part of German troops, resumed the offensive, before which the Russians had fallen back behind the San. On October 18 the passage was attempted by the Austrians but failed. There was more or less fighting throughout this region: Bukowina had been cleared of Austrians and Czernowitz captured. On November 4 the Russians had recrossed the San, and two days later completely defeated the Austrians.

The Russians resumed their offensive against Cracow. The cavalry advancing westward passed Kolo November 9, and next day crossed the frontier. This showed that the Germans had no idea of making any stand on the Warta. Hence the Cracow movement was coupled with a movement against the Warta, directed against

* August von Mackensen, born (1849) at Haus Leinitz, Saxony; served in the Franco-Prussian War; later studied at Halle; at various times attached to the general staff; colonel of the First Regiment of Hussar Body Guards (1894); raised to the nobility (1899); general of cavalry and general in command of the Seventeenth Army Corps (1908); wrote a history of the Hussar Body Guards and a military history; in European War received chief credit for directing the Austro-German drive which swept the Russians back from the Carpathians across the San and resulted in the recapture of Przemyśl and later in the fall of Lemberg; received Order Pour le Mérite for early victory (1914) at Lowicz.

the left of the Germans, and a general advance began. By November 12 the Uzaok, Lupkow, and Dukla passes were occupied, and by December 6 the Russians had got to within 12 miles of their goal.

On the 8th, however, they were compelled, after a battle under the walls of the place, to fall back, and on the 12th the Dukla was recaptured. This called for a fresh withdrawal to the Dunajec-Biala line, past Tarnow to Krosno. The Dukla-Lupkow pass was the next to fall to the Austrians (probably Germans), but now the Russians counterattacked, and succeeded in taking the Galician entrances of the western passes.

Second Drive at Warsaw.—It was partly to relieve this serious threat against Cracow that Von Hindenburg opened his second offensive against Warsaw. By November 15, he had driven the Russians towards Kutno, who on the 18th crossed their left over the Bzura from Lodz westward. On the 19th, Von Mackensen had broken the enemy's lines between Lodz and Strykov. Into this gap he drove two corps; with the Russian army cut in two, it looked as though a decisive success were at hand. But reinforcements coming up just in time, re-established the line; the two German corps, however, after a most desperate struggle, November 24-26, in which they suffered frightful losses, managed to break out to the north. The Russians on December 6 abandoned Lodz; on December there began a three weeks' battle for the possession of Warsaw. When it closed, Warsaw was still in Russian hands, whose line now followed the Bzura-Rawka River to the west of Kielce through Tarnow, joining the forces on the Dunajec. By taking up this position, Lowicz, Petrikov, Tomaszow, and other towns were abandoned to the Germans, but the line was better, and in war it is armies and not cities that count. The year closed with the repulse of German attacks upon this line of the rivers.

Russian Campaigns; Przemyel.—In the winter of 1914-15, fighting continued over the whole front from the Baltic through Poland along the Carpathians to Bukowina. A serious assault on the Bzura-Rawka line, including the considerable battle of Borzynov, ended in a German check. In the north, the Russians had to fall back across the East Prussian frontier, losing Lyck (Feb. 7-20). They, however, repelled the German attempt to reach the Warsaw-Petrograd (St. Petersburg) railway. Ossowiec continued to distinguish itself by resisting a renewed German attempt to take it, and the offensive in this region closed with no special advantage to the Germans. On the Narew, they were beaten (Feb. 26) near Prasnysz, which they had captured on the 24th, thereby threatening Ostrolenka.

In the south a vigorous attempt was made to relieve Przemyel. This involved the control of the Carpathian passes. One of these, Kirlibaba, was captured by the Russians, Jan. 17, 1915. They already had the crest of Dukla, controlled Lupkow and were in the foothills everywhere else. To turn them out, three Austrian armies attacked the positions. The left made little headway, but east of the Lupkow, all the passes were taken. At Koziowa, a battle lasted from February into March, in which the Austrian assaults were beaten off, thus saving Stryj and Lemberg, and preventing the relief of Przemyel.

In Bukowina, the Austrians took Czernowitz, Kolomea, and Stanislaw, only to be driven out of this latter place, and compelled to fall back to the Kolomea-Czernowitz line. No relief therefore coming, Przemyel, after a siege of seven months, fell on March 22, 1915. The Russians now renewed their attention to the passes; only by controlling them could they hope to invade Hungary, and whether they should attempt this or not, it was of the first importance to hold the passes in order to protect their flank against attacks coming from the south. As a result of their efforts, the Russians claimed (April 12-18) the capture of a considerable part of the principal chain. But these operations had little or no effect on the general situation, any more than the Russian capture of Memel (March 17), which they evacuated four days later. More serious was the German invasion of Courland; there was an affair at Shavli (April 29) and Libau was entered on May 8. The Germans had broken ground for severe efforts to be made later.

Russian Defeat and Withdrawal.—These and all other contemporaneous events in this theatre, however, pale into insignificance in comparison with the Austro-German offensive on the Dunajec line. Aroused by the unexpected success of the Russians so far, the Central Powers rose to the occasion, and by an application of their powers of organization prepared during the winter of 1914 and spring of 1915 for a campaign about the issue of which there was from the outset not a shadow of doubt.

At the end of April four German corps stood between the Middle Pilica and the junction of the Nida and the Vistula; on the west Galician front were at least 10 more corps, half German, half Austro-Hungarian, while the Carpathian front was held by 12. The leader of all these forces was General von Mackensen. Opposed to him the Russians had barely 14 corps, commanded by General Ivanoff, who had under him Dmitrieff and Brusiloff. The Austro-Germans for the approaching campaign had brought together a number of guns, and supplies of ammunition, more staggering to the imagination than their concentration of men. It is said that over 4000 guns were collected, of which over one-half exceeded 8 inches in calibre. The work of preparation, which perhaps is unique in military history, would perhaps have been impossible but for the admirable roads, both rail and ordinary, in the region to the south and west of the scene of the conflict. The campaign was planned by Erich von Falkenhayn.*

The end now sought by the Central Powers was to crush the Russians so thoroughly that they should no longer be a factor in the war. As early as April 28, Mackensen had advanced against Gorlice. Three days later (May 1) the tremendous batteries opened, and continued for several hours on the 2d. It is said that in this time 700,000 rounds were fired. The Russian first line was powdered out of existence. The

* Erich von Falkenhayn, born (1853) at Burg Belohau; entered the army in youth; military attaché to the Legation at Paris (1887); military instructor and favorite of the Crown Prince and Prince Eitel Friedrich (1889); chief of the general staff of the Ninth Army Corps (1898); served in China during Boxer Rebellion (1900); lieutenant general (1906); retired (1910), but became active again in the European War; Minister of War (1914), in which office he upheld the officers whose conduct in Alsace resulted in the Zabern disorders; succeeded Moltke as chief of the general staff (December, 1914), the youngest man ever to hold that office, and was made a general of infantry.

Austro-Germans crossed the Dunajec-Biala line at various points; once the front broken in, Von Mackensen advanced sending his right due east to reach Dukla Pass, hoping to catch the Russians in Hungary before they could make their retreat by it; his left and centre changed direction so as to face northeast. This manœuvre forced the Russians to abandon Tarnow and widen the gap already made in their lines near Gorlice.

The campaign that followed the defeat of the Russians in the battle of Gorlice and their dislodgment from the lines of the Dunajec, of the Wisloka, and of the San, respectively, consisted in a pursuit by the Austro-Germans that resulted in a withdrawal from the passes, in the evacuation of Bukowina (June 12) and in the recapture of Jaroslav (May 15), Stryj (May 31), Przemyśl (June 3), and of Lemberg (June 22). Galicia was cleared of Russians.

But as may be inferred from these dates, the Russians offered a stubborn resistance at every point and sometimes, as at Opatov (May 15-17) and at the crossings of the Dniester, even repulsed their pursuers. The fact is that, although defeated and driven back, they had not lost their cohesion as troops and were ready, whenever circumstances favored, to give a good account of themselves. We are compelled to believe that in this tremendous campaign the Russians were taken by surprise, that the magnitude of the attack was unexpected by them. It seems to be reasonably certain, moreover, that they lacked the guns and shells to reply effectively to the terrible Austro-German artillery.

Entire Eastern Front.—The operations for the fall of Przemyśl and Lemberg must be regarded as the prelude of a general offensive on the entire Russian front from the Baltic to the frontier of Rumania. The immediate effect of the Galician campaign was to force the withdrawal of the Russians in this part of the tremendous theatre to a defensive position behind the Złota Lipa and the upper Bug, which remained the line of separation in this region until August 27. On the side of the Central Powers it was necessary in this region to guard against any counter offensive originating in Volhynia and menacing the right of the forces that turned northward against the line Lublin-Kholm in the general offensive that now gathered headway. This new offensive as just stated extended over the whole eastern front, along a line over 1000 miles long, and opened in the middle of July. But already, on June 28, the advance had been begun against Lublin-Kholm. This advance received a check, however, July 1-7, in the severe defeat of the Austrians at Krasnik, a victory from which, save in the important element of time gained, the Russians derived no benefit. The German campaign had for its main object to bag the Russian armies. It is clear that the Russian situation was most serious. Four lines of railway formed their lines of communication, the Petrograd-Vilna-Warsaw, covered by the Niemen and Narew; two interior lines, Siedlce-Warsaw, and Brest-Litovsk-Ivangorod, without any natural defenses; and the Kovel-Kholm-Ivangorod line in the south. These four lines are interconnected by three others running approximately north and south. If these railways could be seized by the Austro-Germans before the Russians could withdraw by them, a material part of the Russian forces in Poland could be cut off and surrounded.

Pressure was applied everywhere, thus robbing the Russians of the advantage of their interior line; specifically the Vistula and the Narew and Lublin-Kholm lines were to be forced. In the north Von Bülow was to renew his attacks; if successful, the Petrograd-Vilna-Warsaw line would be cut. In the south the Austrians were to cross the Dniester and roll up Ivanoff's left wing.

A week after the opening of the campaign the Russians had abandoned the line of the Bzura; Von Gallwitz had crossed the Narew between Pultusk and Ostrolenka, where he was held by the stubborn resistance of the Russians. Further north, Mitau and Shavli were captured. In the south the Austrians failed in the Dniester region; the offensive against Lublin-Kholm, renewed July 15, was successful, the Russians suffering a defeat at Krasnostaw. But they offered so stout a resistance immediately afterward, that it was not until July 30 that Lublin was reached.

Campaigns around Warsaw.—But the Austro-Germans were too strong for the Russians, who had managed, west of Warsaw, to hold the Blonie lines as late as July 26. On the 30th, however, the Germans crossed the Vistula, 20 miles north of Ivangorod. This fortress fell on August 4, and Warsaw was evacuated on the 5th. Novogeorgievsk, however, was not evacuated, as it was thought capable of delaying the German advance. It fell, however, under the fire of Von Beseler's guns on August 19. The necessity of abandoning Warsaw had been foreseen, and preparations made for withdrawal. Part of the forces retreated to the Narew, and part joined the forces on the south. This was the opportunity for the Austro-Germans. Could the forces pressing south and north from the Narew and Lublin-Kholm, respectively, join hands in the Siedlce-Lukow region, a lasting victory would have been achieved. But the Russians offered an extremely stiff resistance between the Narew and the Bug. They held so strongly on the Vyshkoff-Ostroff line that the Germans shifted their efforts to the northeastward between Ostrolenka and Vilna. Here they did break through on August 9 and on the 10th captured the fortress of Lomza. But even after this success their advance was slow; and in the meantime the Russians had succeeded in escaping. In the south an equally stiff resistance was offered. Here in the neighborhood of Lubartoff a serious battle was fought August 6-9; although a Russian defeat, it gained time for the withdrawal of the last forces further north and west.

The attempt made against Riga August 9 to September 8 came to nought, but on August 17 Kovno was taken and the line of the Niemen thus broken. The effect of this German victory was the abandonment of Brest-Litovsk and a withdrawal along the whole front from Ossowiec (abandoned Aug. 22) to Vladimir Volynski. Grodno was evacuated September 1-2. In the south, Kovel was (Aug. 23) entered by the Austro-Germans, and the Russians were compelled to evacuate their line of the Złota-Lipa and the upper Bug. Pinsk was occupied.

Thus, four weeks after the fall of Warsaw, the Central Powers were in full possession of the entire line Niemen-Bug. They had failed to capture the Russian army, but Poland had fallen into their hands with its fortresses. They now directed their attention to the capture of the

railway running from Vilna to Rovno across the Pripet Marshes. East of this railway lies a vast stretch of marshland not traversed by any other north and south line; if this road could be taken from the Russians, the Austro-Germans would have a line of communication between their northern and southern theatres of operation, while the Russians would find their own forces cut in two by the marshes. The operations of the Germans north of the marshes were successful. On September 19, the evacuation of Vilna was ordered. In the south, on August 27, the Austro-Germans had renewed their offensive. The Russians withdrew into Volhynia, were beaten at and lost Lutsk, and forced to cross the Styr. Dubno was entered on the 7th. But on the 8th the Russians struck back, inflicting a defeat on the Austro-Germans at Tarnopol and again at Tremblowa. On the 23d they succeeded in recapturing Lutsk.

Baltic Campaign.—As may be imagined, the fall of Vilna did not end the Austro-German offensive. Once in possession of it, the Germans advanced eastward, sending five cavalry divisions towards Polotsk. Detachments of cavalry were also sent out against the Molodetchno-Polotsk railway, while strong forces were converging on Minsk. Just north of the Pripet Marshes another force undertook an enveloping movement against the line Minsk-Bobruinsk; that is, a movement over a front of 150 miles was initiated, partly to cut off, if possible, the retreating Russians, and partly to confirm the German hold on the Riga-Dvinsk-Vilna line. Contact was made in the region around Vileika. After several days' fighting the Russians managed to straighten their front, and even took the offensive. They cleared the Polotsk line, held on around Vileika and Molodetchno, and further south succeeded in checking the German advance. It is possible that the need of troops in Serbia and on the western front may explain the German failure to continue the offensive.

In the meantime an important attack was being made on Dvinsk. On September 24 a battle was fought between the Dvina and Lake Drisviaty, 20 miles south of Dvinsk, in which the Germans made no gains of any consequence. Later, October 4-18, they concentrated their efforts between Illukst, 15 miles northwest of the city, and Lake Sventen, five or six miles due west. There was severe fighting in this region, but with no particular advantage to the Germans until October 25, when they captured Illukst, and a day or two later made other advances. But these gains were more than neutralized by the Russian counteroffensive, which opened October 31, between Lake Sventen and Ilcen (battle of Platokovna, a village between the lakes), and resulted in a German defeat. The Russians followed up this victory by further advances to the north and northwest of Illukst, and towards that place itself. By the end of November, fighting ceased in this particular sector.

Riga.—The Germans were no more successful in front of Riga. This city, on the right bank of the Dvina, is protected on the southwest by the Tirul swamp, crossed by the railway and road from Mitau through Olai, which constitutes from this direction the only possible approach. The German lines about mid-October ran south from the sea along the river Aa to Mitau, and thence curved eastward to Friedrichstadt and Jacobstadt on the Dvina, halfway between Riga and Dvinsk. Three possible lines of attack

existed—the Tukkum-Riga railway between Lake Babit (west of Riga) and the sea; the Mitau-Olai line; and one from the southeast, from an island (Dalen) in the river. On October 14 the Germans opened, and managed by October 20 to reach the river at Borkowitz, 20 miles up. But they failed to cross the river in spite of all their efforts. Their centre in the meantime had got to Olai, but could go no farther. During the first half of November they tried the first line mentioned above, but on the 10th the Russians, assisted by their fleet, beat them back, and later pushed on beyond Kemmern. These attempts to take Riga proved a failure.

In the beginning of December, 1915, the Germans captured the Borseünde position on the Dvina, but at Dvinsk continued to lose ground about Lake Sventen and at Illukst. On the other hand they beat off with great loss an attack on Postavy, 50 miles south of Dvinsk.

During the last ten days of March the Russians developed without effect an offensive against the bridgehead at Jacobstadt and the railroad thence to Mitau. Similarly south of Dvinsk they were defeated near Lake Narocz, where their objective was Sventziany, on the Vilna-Dvinsk railroad.

Southern Sector.—We must now turn south to see what was happening in that region. Three days after taking Lutsk (September 23) the Russians abandoned it, and took up a position to the east extending from Rafalovka through Czartorysk and Kolki to a point south of Dubno. Rovno was behind them. The first attempt to converge on that place failed. Von Linsingen then early in October advanced against Sarny, where the Kovel-Kiev railway crosses the Vilna-Rovno line. The capture of Sarny would have meant the loss to the Russians of this latter railway. During the next two months Von Linsingen and Brusiloff were at grips on the middle Styr.

Along the line of the Styr River the struggle continued for the control of the left bank. At the end of the month the Russians took the offensive on the Bessarabian frontier, and advanced along two main lines—first, the Odessa-Czernowitz-Lemberg railroad; second, farther north, the Kiev-Kovel-Warsaw line. In the first region their efforts, centred on the capture of the Bukowinan capital, which had already changed hands five times in the course of the war, met with failure.

In the region of the Styr River, however, they had better fortune. Early in January they succeeded in crossing this line north of the Kovel-Sarny railroad, and in holding on to their position. Thereupon the village of Czartorysk became a storm centre, and was finally captured by the Russians by assault.

Early in February, 1916, they achieved some gain in the Lutsk-Rovno-Dubno sector; the Germans were reported as standing on the defensive along the Pruth, the Dniester, and the Sereth. Further Russian advances also were reported, the most important being the capture of Uscieczko, on the Dniester, thus again threatening Czernowitz.

In April, 1916, Brusiloff succeeded Ivanoff in command of the armies from the Pripet Marshes to Rumania, and began preparations for a general offensive on this line. Heavily fortified as it was, the Austrians had believed it to be so strong that they had transferred many of its defenders to other fronts.

The Russians opened northwest from Rovno

through Lutsk towards Kovel; west along the Rovno-Lemberg railway towards Dubno; northwest from Tarnopol towards Lemberg; and south across the Pruth against Czernowitz. Great success attended the effort. Lutsk, abandoned by the Austrians, fell on June 6; Dubno on June 10, with 35,000 prisoners and 30 guns as additional prize; farther south on the same day Buczac and Potok Zloty were entered and many more prisoners taken. But now the resistance of the Central Powers stiffened from Tarnopol to Kolki, and the Russian advance was checked, giving way to obstinate fighting by both sides. It is believed that the Germans came to the Austrian rescue on this portion of the front. Beaten at Dobronobtz (18,000 prisoners, 10 guns), the Austrians, June 17, abandoned Czernowitz. The effect of its fall was greatly to imperil Pflanzer's army. A small part of this army was pushed over the frontier into Rumania and interned; the main body, cut off from communication with Lemberg by the capture of Kolomea and the threat against Stanislau, was crowded against the flanks of the Carpathians.

In this great movement of the Russians the significant thing was the loss of the Austrians in prisoners (250,000) and in killed, wounded, and missing (unknown), an irreparable loss. Hungary alone admitted a loss of 600,000 men in this campaign. In ground gained, the Russians had recovered about 15,000 square miles of territory. By the middle of July (1916) the Russians were still some miles from the railroad centre of Kovel; and in their progress towards Lemberg, had reached the Zlota Lipa River.

The situation on the eastern front became so serious that the German General Staff determined to reinforce the weakened Austrians with German troops. Consequently, General von Linsingen was sent at the head of 200,000 men. These were sent against the Russians west and northwest of Lutsk. Their presence was immediately felt, inasmuch as they won important successes at Kiselin and Lokatchi. Many Russian prisoners fell into their hands. The Russian offensive was checked effectively for the time being at the Stokhod River. The advance on Lemberg was also stopped at the Galician frontier at Brody.

The advance in the south nevertheless went on almost as rapidly as before. After the capture of Czernowitz the Russians again overran the Bukowina. They proceeded down the railroad to Radautz, cut off the retreating Austrians and took over 1000 prisoners. West of Czernowitz the opposition was stiffer but on July 1, the important railroad junction at Kolomea was captured and a little later the railroad running from Lemberg into Hungary was cut at Delaytyn. This seriously threatened the Austrians in the north. New gains were now made in the Kovel sector. They crossed the Stokhod River at Ulgi by means of pontoon bridges and made another great thrust at Kovel in the face of extremely heavy resistance by Von Linsingen. On July 16 they captured 30 guns and 13,000 prisoners at the battle of Svinusky. On the 28th, they captured Brody and advanced upon Lemberg. Lemberg was now threatened on three sides and was in serious danger of being enveloped.

The Russians now seemed to concentrate all their efforts to capture this stronghold. They advanced from Dubno and Tarnopol on the north and from Stanislau on the south. They captured this latter place with very little effort.

In the Carpathians the Russians also continued their successes, by capturing Jablonica.

South of Brody the Russians captured an entire ridge held by the Teutonic forces on the 5th and 6th of August. The ridge contained six villages. More than 5000 prisoners were taken. On the 8th 8500 more prisoners were taken in eastern Galicia. The Central Allies continued to retreat in this region as the Russians continued to gain on the Sereth and Zlota Lipa rivers. On the 14th the town of Tustobaby, a strongly fortified point was taken. This put the Russians several miles west of General Bothmer's front and menaced his flank and rear. So serious was his position that he was compelled to abandon the Strypa River line. Immediately upon the fall of this line General Letchitsky struck on both sides of the Dniester. He drove the Austrians out of the Jablonica Pass and thus opened up the way to Kutly.

During September the Russians were able to make little progress toward Lemberg. They were checked at Halicz and were not able to advance on the Kovel-Vladimir-Volynsky line. Heavy fighting occurred at Brzezany and very heavy assaults were made further south. The results of these were the abandonment by the Germans of the entire Strypa and Zlota Lipa river lines. Now the only natural boundary between the Russians and Lemberg was the Gnila Lipa River. All attempts to take Halicz, however, failed and a strong German counter offensive compelled the Russians to give up much of the newly captured territory. They also lost about 5000 men in prisoners.

In October the Russians renewed their assaults in the general direction of Lemberg. On October 4 the Zlota Lipa was crossed after a severe three days' battle south of Brzezany. North of Lemberg intense fighting occurred along the Brody-Lemberg railroad. Along the Stokhod the Russians merely kept on the defensive in order to keep the Teutonic allies from starting an offensive movement. The latter, nevertheless attempted to relieve the pressure on Lemberg by beginning an offensive movement in the Carpathian Mountains. This extended from the Rumanian border to the Jablonica Pass, a front of 75 miles. The Russians immediately gave way in the Negra valley.

West of Lutsk the Russians made some gains south of the Stokhod along the Luga River. This enabled them seriously to menace the city of Vladimir Volynsky which controlled the southern entrance to Kovel. The beginning of the severe Russian winter now seemed to put an end to the Russian forward movements and the Teutons took the opportunity to strengthen their lines. Their weakest point was along the Stokhod. They advanced here as well as on the Navayuvke, which flows near Halicz. On November 9 an extremely heavy attack was made on Russian positions at Bkrobowa in Volhynia. The Russians, after savage resistance were compelled to fall back to their second line of trenches. Another German blow at Dorna Watra also was successful and compelled the Russians to relinquish newly won positions. In this latter engagement they lost over 4000 prisoners. As a result of the taking of a bridgehead on the Stokhod the German hold on Halicz was considerably strengthened.

In December, 1916, and January, 1917, the entire eastern front was practically quiet. The Germans contented themselves with small sorties

and trench raids in order to protect their positions in Volhynia. The chief Russian activities during these months were in the south where they attempted to relieve the tremendous pressure being exerted on Rumania. Their aim was to threaten Von Falkenhayn's rear by crossing the mountains and securing the railroads which were the arteries which fed his troops. The main point of attack through the Trotus valley was unsuccessful, and by the middle of December was abandoned.

In order to relieve the great Teutonic pressure on Rumania, the Russians began an offensive in the Riga sector during the first week of January, 1917. They attacked the German lines in the Lake Babit region west of Riga and advanced more than a mile, capturing a fortified position between the Tirul swamp and the Aa River. Heavy fighting, usually successful to the Russians, occurred along the Dwina and south of Dwinsk as well as in the neighborhood of Vilna. These gains were held in the face of strong German counter attacks.

During the third week of January the Russian offensive appeared to have broken down. They were compelled to release their hold on the newly won ground between the Tirul swamp and the Aa. On the 25th the Germans attacked on both banks of the Aa and captured several fortified positions along with 2000 prisoners. Strong Russian counter attacks failed and towards the last part of the month they were driven back an additional two-thirds of a mile. For the participation of the Russians in the Rumanian campaign see *SOUTHERN THEATRE, Rumania*.

Russian Revolution.—On March 9, 1917, began one of the greatest events in world history. That was the Russian revolution. Its immediate cause was the inefficient handling of food supplies in Petrograd. Its remote cause was the growth of a democratic Russia, which could no longer be controlled by the Czar and his bureaucratic, pro-German government. A vast majority of the Russian people who felt that the overthrow of the Czar would be a hard task were agreeably surprised at the ease with which it was consummated.

The first institution attacked was the cabinet. The revolutionary army rushed into the administrative buildings and arrested or executed the former premier, Stürmer, a Germanophile, Protopoff, the Minister of Interior, Golitzin, the premier, Rittich, the Minister of Agriculture and many other conservative bureaucrats. The Duma immediately took control of the government and appointed a Committee of Safety, headed by Michael Rodzianko, President of the Duma. A delegation was immediately sent to the Czar demanding his resignation. The Czar abdicated, giving the throne to his brother, Michael Alexandrovitch. Another delegation was sent to Michael which compelled him to give up his claim to the throne. Democratic rule in Petrograd immediately began to destroy all traces of the Romanoff dynasty. The Secret Service, most detestable to the Russians, was abolished. The fortress of St. Peter and St. Paul, comparable to the Bastille, was captured, and all the political prisoners released. The Winter Palace, scene of Bloody Sunday in 1905 (see *RUSSIA, History*), was taken over as a meeting place for the Duma. Even the orthodox church, which was a stronghold of Czarism, came over to the side of the revolutionists. This event was of almost as great importance as the overthrow of the Czar himself.

The Committee of Safety set the new government in motion by appointing a cabinet. It was composed of the best men in Russia. Prince George Lvoff was made Premier. He was of royalist descent and a man of untiring energy, great business experience and a thorough democrat. The Minister of Foreign Affairs was Paul Miliukoff (see *MILYUKOV, PAVEL*), who was chiefly responsible for the overthrow of the Stürmer ministry. The Minister of War and Navy was Alexander Guchkoff, Minister of Agriculture, Shingareff, Minister of Justice, Kerensky, who was to play a prominent part in the later history of the revolution, Minister of Education, Manuiloff, Minister of Communications, Nekrasoff, Minister of Trade, Konovaloff and Controller of the State, Godneff. Roditcheff, a strong advocate of the rights of free nationalities, was appointed Governor-General of Finland. The Jews were given political and religious freedom. The leaders of the Zemstvos (see *RUSSIA, Government*) were ordered to take over the governorship of the provinces.

The first country to recognize the provisional government was the United States, which sent a message of recognition through Ambassador Frances on March 22. Great Britain, France and Italy did likewise the next day. The new government was put in a smooth running order in a week. Internal abuses were done away with and the work of reorganizing the army was undertaken. Grand Duke Nicholas (q.v.) was removed as Commander-in-Chief and General M. V. Alexieff was appointed his successor.

Events moved rapidly throughout all the Russias during the next few weeks. Czar Nicholas was imprisoned in Tsarskoe Selo, but was later removed to Tobolsk. An excess war profits tax was levied on all war industries. All the imperial lands and monasteries were confiscated. In the cities a mania for organization raged. Trade unions sprang up and the 8-hour working day appeared in almost all the cities. Even the peasants organized a council of peasants' deputies. One hundred thousand exiles made a triumphant journey across Russia from Siberia. Premier Lvoff stated on April 10th, "The object of independent Russia is a permanent peace based on the right of all nations to determine their own destiny." Kerensky stated that if the German people would throw off the yoke of autocracy, the provisional government would offer preliminary peace negotiations.

Despite the celerity and thoroughness with which the provisional government took over the reins of authority, there were signs of unrest throughout the country. A party of Russian radicals under the leadership of Lenine was allowed to pass through Germany from Switzerland to attend a Socialist conference at Stockholm. Another disturbing element was the Council of Workmen's and Soldiers' Delegates. This body, whose name is self-explanatory, passed a resolution of April 16, stating that it was necessary for it to exercise influence and control over the provisional government and called upon the people to back it up as the only body able to put down any reactionary movement. They took military matters into their own hands and arrested several conservative officers.

In the first two weeks of May a decided breach appeared between the government and the Council. It occurred over the war aims of the new government. After a series of radical outbreaks headed by Lenine, the Council demanded that the

government assert its aims. This was done when a note signed by Miliukoff was sent to the Allied countries to the effect that Russia pledged herself against a separate peace and asked for a cordial renewal of bonds between Russia and the Allies. The members of the Council vigorously protested against this stand and stated that they would compel the government to accept their views or else resign. Hostile demonstrations occurred in the street of Petrograd. Parleying between the Council and the government went on for several days which resulted in the weakening of the latter. General Korniloff and Minister of War Guchkoff resigned because the Council practically took all power from their hands. Appeals to the patriotism of the soldiers and workmen were of no avail.

On May 15, the Council suddenly determined to accept a suggestion offered by Kerensky sometime previously, to form a coalition government. This decision was issued in the form of a manifesto and also declared against a separate peace and fraternizing between German and Russian soldiers. Peace was to be brought about by an appeal to the socialists of Austria and Germany to overthrow autocracy.

Foreign Minister Miliukoff resigned on May 16 because of a dispute in the government over the question of coalition. Thereupon the cabinet was entirely reorganized. Tereshtenko replaced Miliukoff and Kerensky became Minister of War. Kerensky was a Social Revolutionist and one of the most popular men in Russia. The day before the coalition cabinet was formed, President Wilson announced the personnel of a special mission (headed by Elihu Root), which was to go to Russia to counteract German influences favoring a separate peace. He also announced the sending of a railroad commission which was to aid in the reconstruction of Russian railroads.

The reorganized cabinet declared that it stood for a general peace only and that it favored no annexations and no indemnities. Within a week internal dissension caused a partial downfall of the cabinet. Strikes caused by the exorbitant demands of the laborers occurred daily throughout Russia. The Kronstadt Committee of the Council of Workmen's and Soldiers' Delegates declared their independence of the Provisional Government, and General Alexieff resigned as Commander-in-Chief of the army. He was succeeded by General Brusiloff. The outstanding figure in the Revolution now was the Minister of War, Kerensky. It was only his eloquence and patriotism that held in abeyance the complete collapse of the economic and military forces of the government. Backed by the All-Russian Council of Peasant Deputies, which voted against a separate peace, and for a vigorous prosecution of the war, he introduced strong disciplinary methods into the army.

The attention of the country and government was now given to the internal political situation. On June 8, a meeting was held by the commercial, industrial and banking institutions. This body declared against a separate peace. On June 12, a committee of the Duma composed of 61 members met to plan for a meeting of a Constituent Assembly, which was to draft a permanent constitution for Russia and to solve internal economic, industrial and racial problems. Both men and women were to be allowed to vote for the deputies. Changes were made by the government whereby the cantons and communes, which heretofore had no local self-government, were to

be governed by peasant administrators elected by universal suffrage. A law was also promulgated which gave Finland complete internal autonomy. All anti-Jewish laws were repealed.

On July 17, there occurred serious riots in Petrograd between the Radical Socialist element under Lenine and government forces. The purposes of these anarchistic demonstrations was to overthrow the provisional government and to recall the armies from the fronts. After four days of heavy fighting in the streets the rioters were dispersed and their leaders ordered arrested. Lenine escaped. Another situation which caused five cabinet members to resign was the Ukrainian problem. The Ukrainian party demanded autonomy for the region in southwest Russia and part of Galicia. It was their demand that autonomy be granted immediately that caused the five Constitutional Democrats to resign from the cabinet.

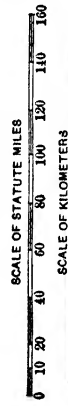
On July 20, Lvoff, the Prime Minister, resigned. Kerensky was appointed head of the cabinet and also kept the portfolio of War and Munitions. He was made a virtual dictator with unlimited power. He later became the President of the Russian Republic. His government was backed up by the Joint Council of Workmen's and Soldiers' Council and of the All-Russia Council of Peasant Delegates. Kerensky immediately ordered all deserters to be shot and all revolutionary agitators to be arrested wherever found. General Brusiloff resigned on August 2 and was succeeded by General Korniloff. The radical disturbances and the spreading of anti-war propaganda had completely demoralized the army, with the result that they retreated everywhere on the Galician front.

Owing to the serious condition of the entire country, Premier Kerensky called together an "Extraordinary National Council" to meet at Moscow on Aug. 26, 1917. He determined not to wait for the meeting of the Constituent Assembly. The conference was composed of 2500 men representing practically all the parties in Russia. The internal conditions of the country were outlined by members of the cabinet, and the condition of the army was outlined by Generalissimo Korniloff. The conference had the authority to take direct action, but it clearly showed the division of the country. On the one hand was the socialistic element represented by Kerensky, and on the other hand the conservative bourgeoisie element represented by the commanders of the armies and the constitutional democrats. The radical Bolshevik element, which was to play a commanding part later, was not very strongly represented because of repressive measures taken by the government. Almost contemporaneously with the Moscow conference came the announcement on September 3 of the fall of Riga (see below). The effect on Russia was tremendous. Monarchist plots were discovered, and Petrograd feared that the German army would advance on the capital. The government was severely criticized for the lack of discipline in the army.

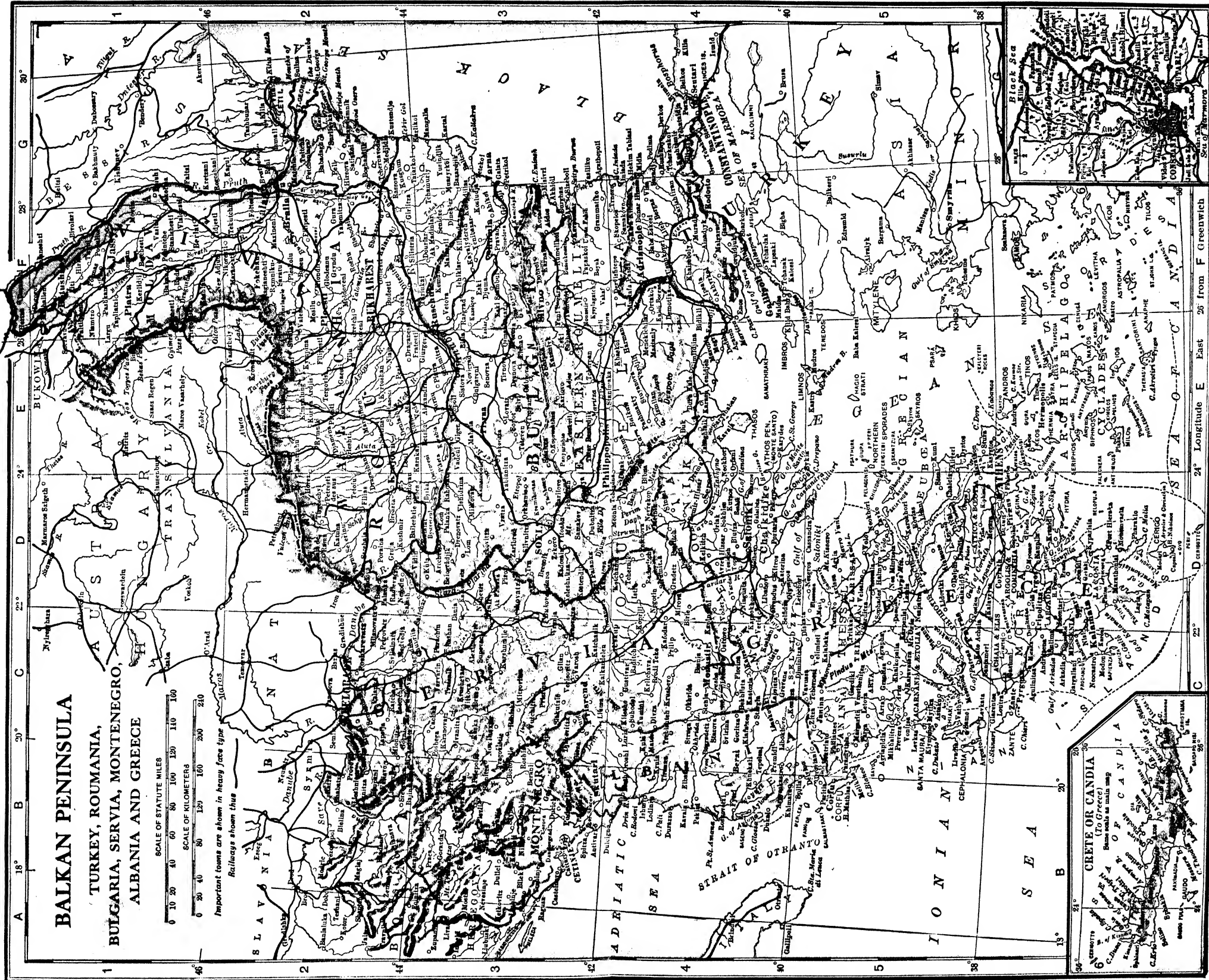
The crisis came on September 9, when General Korniloff revolted against the provisional government. A representative of the Duma called on Kerensky and demanded that he turn all the powers of the government over to General Korniloff. Kerensky refused outright and then moved with characteristic dispatch and resolution. He deposed Korniloff, arrested his envoy, declared Petrograd and Moscow in a state of siege and asked for and received the combined backing of

BALKAN PENINSULA

TURKEY, ROUMANIA,
BULGARIA, SERBIA, MONTENEGRO,
ALBANIA AND GREECE



Important towns are shown in heavy face type
Railways shown thus



24° Longitude E East 26° from F Greenwich

the Council of Soldiers and Workmen and the Peasants Council. Kerensky himself became the Commander-in-Chief of the army and advanced to meet the army Korniloff was leading against Petrograd. It had advanced to 30 miles of Petrograd when the entire revolt collapsed, chiefly through the winning over to the government's side of General Alexieff, who had at first favored the revolution.

On Sept. 27, 1917, there assembled at Moscow a Democratic Congress, called into being by the Workmen's and Soldiers' Central Council. It consisted of 1200 members from all over Russia and was under the control of the ultra-radicals or Bolsheviki (majority). The congress provided for a parliament which was to have a consultative function. Kerensky, who organized a new coalition cabinet without consulting the congress, accepted the idea of the parliament, which was to be called the Temporary Council of the Russian Republic. The parliament had the right to interpellate the government, but the latter was in no way responsible to the former. This body was to exist until the Constituent Assembly met in December, 1917.

Late in October, the Bolsheviki leaders stated in no uncertain tones that Kerensky's government had lost the confidence of the real revolutionary party of the country and that it soon would be replaced by them. On November 1, Kerensky gave a statement to the Associated Press, which showed that he had practically given up all hope of restoring civil order in Russia and that urgent help was needed from the Allies if Russia was to continue the war. This was his last official utterance to the public. The Bolsheviki seized the reins of government on November 7, and dismissed the Preliminary Parliament. The guiding spirit was the Revolutionary Military Committee of the Council of Workmen's and Soldiers' Delegates. Trotsky and Lenine, the two Maximalist leaders, spoke before the Council, and the latter stated the problems before Russia. They were, first, immediate conclusion of the war; second, the handing over of the land to the peasants; and third, the settlement of the economic crisis. On November 9, a new cabinet was formed by the Council, in which Nikolai Lenine was Premier and Leon Trotsky Secretary of Foreign Affairs. Kerensky escaped from Petrograd but the rest of his cabinet was arrested. The former premier and a few thousand troops marched on Petrograd, but were defeated by the Bolsheviki. The Provisional Government was overthrown in Moscow and everywhere else the Bolsheviki were victorious.

Chaos and civil war now reigned supreme in Russia. Ukraine again proclaimed its independence, as did Finland. General Kaledines, leader of the Cossacks, with the aid of General Korniloff, declared war against the Bolsheviki, with the avowed purpose of saving the country. Americans and other foreigners took the first opportunity to get out of the country. The Bolsheviki passed a resolution asking for an immediate peace, stating that all belligerent governments should enter into negotiations for democratic and equitable peace. General Dukhonin, who commanded the armies, was ordered to offer an armistice. He refused, and as a result was dismissed. He was succeeded by Ensign N. Krylenko, who was given the title Commander-in-Chief of the People's Commissaries of War. Trotsky, in a statement issued on November 22, said that the Bolsheviki stood for a universal and not for a separate peace. The demobilization of the older

classes of the Russian army was begun. Secret treaties signed by former Russian ministers and foreign countries concerning the war aims of the Allies were published and created a profound impression.

Representatives sent within the German lines were cordially received, and arrangements were made to conduct negotiations for an armistice. Von Hertling, the German Chancellor, told the Reichstag (Nov. 29) that negotiations would be opened with accredited representatives of the Russian government and that he was ready to discuss debatable questions immediately. On December 3, the German government announced that an armistice prevailed from Pripet to south of the Lipa River, and that arrangements were being made to extend them over the entire front. Germany, Austria, Bulgaria and Rumania were represented at the negotiations. On December 8, Trotsky announced that they had been suspended for a week to permit all the belligerents to be informed that they were going on. On December 14, the armistice was finally signed at Brest-Litovsk. It was to be in effect 28 days and could be automatically extended. Another provision provided that peace negotiations were to be entered upon immediately, and consequently by January, 1918, they were in full swing.

While these negotiations were going on, Russian internal affairs were in chaos, and it seemed as though Germany was very anxious to make a peace before the Bolsheviki lost power. None of the Allied countries had recognized the Lenine government, and even the neutrals refused to do so. Continual uprisings occurred. The Cossacks and Ukrainians united against the Bolsheviki, Siberia proclaimed its independence, and even Kerensky raised another force to restore him to power. The much heralded Constituent Assembly met in December, 1917, and was practically shorn of all power because of lack of harmony and equal division of parties. The Bolsheviki did not have the overwhelming majority in it that they expected.

Operations of the Russian Armies under the Revolution.—After the breakdown of the Russian offensive on the Aa River at the beginning of 1917, the Russian front was comparatively quiet until the Russian revolution was well under way. The situation on the entire front was deplorable. Discipline had completely broken down. Generals were appointed and removed or they resigned. The orders issued by the officers had to be approved by the men themselves. Fraternization between the Russian and German soldiers was carried on to a large extent and could not be checked. The situation could not have been much worse. As a result of this demoralization the Germans and Austrians were able to remove several divisions from the Russian front for use on other fronts. What fighting was done was spasmodic and of a local character.

When Kerensky came into supreme power in Russia he reestablished military discipline in the army and inspired the officers and men with a strong anti-German spirit. The result of Kerensky's efforts was the beginning of a strong offensive from Brzezany to Zloczow on the upper stretches of the Zlota Lipa River. The objective was the capture of Lemberg. Brusiloff's army surprised the world with their vigor of assault and their seemingly limitless supply of ammunition. Brusiloff made fruitless attempts to break through at Brzezany and Zloczow and then suddenly shifted his attack south of the Dniester, in

the neighborhood of Stanislaw, where the Austrian and German lines met. The weight of the onslaught broke the Austrian line and the Russian forces pushed through and crossed the Lukwa and Lomnica rivers. They then occupied Kalucz, which had been the Austrian Army headquarters. This town was on the Lemberg-Stanislaw railway. Then the town of Halicz was taken by storm. So far 50,000 prisoners and vast quantities of war material had been taken. A wedge 20 miles long and 10 miles deep had been driven into the Austro-German line.

This drive turned out to be of no avail. Various sections of the Russian army mutinied with the result that the entire army was compelled to retire all along the front. On July 19, the Germans began a countermovement and penetrated the Russian positions on a wide front near Zloczow. Russian trenches near Brzezany were occupied on the next day, owing to the mutiny of the extreme socialist troops. The whole line in Galicia now began to retire. The Germans and Austrians occupied Tarnopol, Stanislaw, Nadworna, Czernowitz, Kolomea and drove the Russians across their own border out of Galicia. Spasmodic attempts to take the offensive in the north to relieve the pressure in the south were frustrated by mutiny among the troops.

Fall of Riga.—The month of September saw the capture by the Germans of the important city of Riga. Its fall was chiefly due to the superiority of German artillery and the defection of the Russian troops. On August 22, the Germans began to advance from Kemmern, between the Baltic and the Aa, and bombarded the Russian positions north of Dvinsk on the right bank of the Dvina River. On Sept. 2, they crossed the river at Uxkul, 16 miles southeast of Riga. The same day outposts entered the city and General Letchitzky withdrew to a prepared line east of the city. The Germans continued their attacks and took Jacobstadt, and penetrated 6 miles on a 26-mile front. The Russians attacked heavily but unsuccessfully. The Germans, in November and December, 1917, withdrew from most of the area captured after the fall of Riga and sent the troops to aid the Austrians in a grand offensive against Italy (see below).

From the military point of view the capture of Riga was of no importance without the occupation of islands which controlled the mouth of the Gulf of Riga. In October the Germans set out to accomplish this purpose. On October 13, forces were landed under the protection of warships on a northern inlet of Oesel Island. By October 15, the chief city of the island, Orensburg, was in their hands. The Russian battleship, *Slava*, 13,516 tons, and several smaller units, were lost in the defence of the Gulf. A landing was also made on Dagö Island, and the Russian garrisons of both islands were compelled to flee to the mainland to the eastward. The Russian Baltic fleet was locked up by the superior German fleet (50 warships) in Moon Sound. The Germans completely occupied the three islands, — Oesel, Dagö, and Moon, — and on October 21, effected a landing on the mainland at Werder, but later withdrew. In the meantime the Russian fleet escaped after inflicting unknown losses on the German fleet. Events on the Italian front prevented a combined land and sea attack on Reval and the coast of Finland.

IV. *Southern Theatre. A. Campaigns against Serbia.*—The campaigns against Serbia have two

main stages: (1) Austrian campaign across the Drina (August–December, 1914), which failed owing to demands in the Russian field; (2) Austro-German-Bulgar invasion of Serbia, to open the road to Constantinople. This campaign ended in the conquest of Serbia and Montenegro (October–December, 1915).

The military strategy of this campaign develops on three fronts: (a) the Germans crossed the Danube and took the line of the Morava valley; (b) the Austrians crossed the Drina and moved up the Lim; (c) the Bulgars, sending one army to beat off Allied reinforcements from Greece, moved on Nish with another army. The Serb army was driven to the sea through Albania.

B. Italian Campaign.—Italy's entrance into the war in May, 1915, relieving Russia, has two main movements: (1) to the north, to close the passes of the Alps against invasion; (2) to the northeast, to cross the Isonzo and take Trieste.

The Isonzo line was reached, but the operation was not completed. An Austrian invasion from the north (May, 1916) was checked mainly by an opportune Russian drive into Galicia.

The work before the Italians was therefore simple in respect of conception, difficult in point of execution. The configuration of the frontier at once fixed the nature of the task. It was absolutely essential to close the passes of the Alps from Switzerland eastward, in order to protect the flank and rear of their armies on the Isonzo line, and to prevent invasion of Italy. This condition secured, the task of the remainder of the forces was to cross the Isonzo, for it must not be forgotten that Italy's material objective was Trieste with the Istrian Peninsula.

Four armies took the field, two on each frontier, the northern and eastern. A fifth force, composed of Bersaglieri and Alpini, was designated for operations in the Carnic Alps. Gen. Count Luigi Cadorna,* the chief of the general staff, was in general command. On May 24 the frontier of the Trentino was crossed. Two weeks later the Italians were well advanced in the Trentino and Tirol; the road to Verona was closed. It would seem that the Austrians during the opening days of the campaign in this region had opposed but slight resistance to the forward movement of the Italians. Further east a more severe struggle took place for the possession of the passes of the Carnic Alps. Here the Italians took the Plöcken Pass and gradually extended their hold upon the peaks to its east and west, thus closing the gateways opening southward into the valley of the Tagliamento. The struggle continued in the mountains during the entire summer, and took place chiefly at high altitudes. In the Trentino as a whole the Italians managed to get control of most of the roads leading into their country. West of Lake Garda (Val Giudicaria) they pushed forward in the autumn and got close to Riva. On the east side of the lake, by the end of the year they were in the outskirts of Rovereto. Farther east, on November 7, Col di Lana was taken by Garibaldi, but later aban-

* Count Luigi Cadorna, born (1850) at Pallanza, son of Gen. Raffaele Cadorna; graduated from military academy at Turin (1868); colonel (1892); commander of Tenth Regiment of Bersaglieri; chief of staff of the Army of Florence; major general (1898); commander of the division at Naples (1907) and at Genoa (1910); designated commander of an army in case of war (1911); chief of the general staff; preparation for participation in European War worked out by him in detail and he became generalissimo of the entire Italian army; author of notable pamphlets on tactics.

done, only to be recaptured in April, 1916. In the Carnic Alps the Austrians made desperate efforts to dislodge their adversaries from the passes seized by them in June, but to no avail; the Italians held. They failed, however, to get the Malborghetto works, but had better success in forcing the Austrians to abandon the Plezzo valley. South of Plezzo, Tolmino was invested, but without success.

The nature of events on the eastern frontier was almost wholly determined by the obstacle forming the line of separation between the contending armies, i.e., the Isonzo River. From its left (Austrian) bank rise ridges upon ridges, whereas the right bank, from which the attack must come, below Gorizia (Görz), is flat (the Friuli plain). In crossing the river, therefore, the Italians would be compelled to fight uphill. The rectangle Gorizia-Gradisca-Triest-San Daniele is occupied by the Carso (Karst) plateau, with hills from 150 to 1700 feet high. This plateau would have to be taken, or at least a passage opened through it, before Triest could be reached. On May 24 Italian troops occupied various small towns just across the frontier. Their troubles began when they undertook to cross the Isonzo, for soon after reaching it they found it in flood. It is said that their difficulties were increased by the failure of the cavalry to seize the bridges at Pieris. A dash for these bridges would have insured a crossing and might have given possession of a part at least of the Carso plateau. As it was, the Austrians blew up the bridges before any Italians got across. The flood subsiding on June 5, a crossing was made at Pieris and Monfalcone occupied. But now a fresh obstacle presented itself. The Austrians flooded the low country at the foot of the Carso plateau. The advance against the plateau was thus blocked, and operations along the entire line delayed. Another crossing had to be sought unaffected by the flood conditions. The point selected was just above Sagrado, where the river makes a great salient to the west; unsuccessful attempts were made on June 9, 15, and 23.

It was therefore decided to make a general advance along the whole line of the Carso, a movement which began June 18. By the 23d various villages at the foot of the Carso had been taken. A fourth attempt to cross succeeded on the 24th. The Italians by the 27th had got a bridgehead on the Isonzo and a line of advance to the Carso plateau. This struggle formed part of a general struggle over the whole line from Plezzo to the sea. The conflict was necessarily intensified at certain points, such as Gorizia, Plava, and Tolmino.

Gorizia.—Gorizia lies in a bend of the river, and is dominated by the hills behind it stretching away into the general mountain system. On the west bank Monte Sabotino, itself commanded by the hills on the eastern bank, likewise controls the position; from Sabotino run out the Podgora heights well below (south of) Gorizia. Between Podgora and Gorizia is open ground 3 miles wide, bounded on the southeast by the river. Sabotino and Podgora, thoroughly organized defensively by the Austrians, were unsuccessfully attacked by the Italians at the end of May. They were more successful at Plava. Back of the village stands Hill 383, and south of 383 a peak known as Kuk. The Italians hoped, if they could get across, to work down the left bank and menace Monte Santo, the bulwark of the Austrians on

this bank in the Gorizia sector. Attempts to cross by bridging on the 8th and 10th of June were defeated, but on the 11th two battalions were got over by rafting and attacked Hill 383, securing a footing on the lower slopes. Reinforcements enabled the Italians on the 17th, after heavy fighting, to gain the summit. They held the hill thereafter in spite of the efforts of the Austrians to win it back, but were unable to extend their holdings on the left bank.

Tolmino.—At Tolmino the river turns 90 degrees from southeast to southwest. In the bend stand two hills joined by a saddle, Santa Maria and Santa Lucia. These were held by the Austrians, and formed with Sabotino and Podgora the only positions retained by them on the west bank of the Isonzo. North of Tolmino runs a range of high mountains, one of which, Monte Nero, rises over 7000 feet. Tolmino itself was a point of some military importance, probably because the Austrians, should the occasion arise, meant to use it as a point of departure in the invasion of Italy.

The resistance offered at Tolmino was more serious than apparently the Italians had expected. Their attempt to seize it by sudden attack failed, and they were compelled to proceed against the place by regular investment. In the meantime they were more fortunate 10 miles to the northwest at Caporetto, which they had occupied on the first day of the war. The heights across were turned by a column that crossed higher up, climbed the Polonnik ridge, and thus drove the Austrians back on the Monte Nero ridge. On June 2 the highest peak of the ridge was in the hands of the Italians. The occupation of Monte Nero was a necessary condition to operations directed southward against Tolmino, but Monte Nero itself was not safe unless Plezzo, an Austrian base and magazine, could be neutralized. By June 23, the Italians had succeeded in getting into positions from which they threatened the Plezzo valley. They now came down from the north against Tolmino. In August they attacked Santa Lucia and Santa Maria, but were compelled to resort to trench warfare. Later, in October, the offensive was resumed, without however succeeding in dispossessing the Austrians.

Plava.—The war had now lasted over five months without any result of magnitude on the Isonzo front. But on October 18, began a general bombardment from Plava to the sea, as a preparation for an extension beyond the Plava bridgehead in order to attack Monte Santo from the north, for the capture of Sabotino-Podgora, and for the occupation of the Carso plateau. Operations in the Plava sector proved unfruitful, owing to the inability of the Italians to capture Kuk. As long as this elevation remained in Austrian hands, it was useless to think of proceeding against Monte Santo. Hence the attack on the Gorizia front derived no help from the north. The fighting on this front lasted six weeks and at one time Monte Sabotino was actually taken but was not held. In December there was a lull but no cessation. As a result of their efforts the Italians had gained a little, and now turned their guns upon Gorizia itself. On the Carso plateau very little was achieved. Part of Monte San Michele was taken, as well as trenches on the northern slope of the plateau. But on the whole the Italian offensive had failed. The Austrian lines had held at all essential points.

At the end of the year 1915 Italy had gained one of her points. She had closed the gates of her northern frontier, and held the keys. A period of relative quiet then prevailed. In May, 1916, the Austrians began a successful drive down the Adige valley, forcing the Italians back over their own frontier at many points. The Italian towns of Arsiero and Asiago were captured. This campaign against Italy was brought to a sudden halt by the Russian offensive in Galicia, and in a short time the Italians had regained most of the lost ground. In August the Italians won their greatest victory of the war. This was the taking of Gorizia, the key to Trieste. The attack began in the Malfalco sector. Then San Sabotino and San Michele, the other two defenses of the city were taken with a rush. The city itself was attacked from all sides. A bloody engagement was fought at the Podgora bridge crossing the Isonzo. The Italians pushed eastward across the Carso plateau, which extends 22 miles to Trieste. They captured San Grado and several lines of trenches near Loguizza. On October 11 the Italians stormed the whole first line of Austrian defenses. They captured Loguizza and Jamiano. In November the Italians began another great offensive on the Carso plateau and advanced an average of $\frac{3}{4}$ of a mile. They claimed to have taken 39,000 prisoners to date. The wintry months of December, 1916, and January, 1917, prevented further operations. Artillery and aerial engagements were frequent.

Italian Spring and Summer Offensives.—The winter on the Italian front was very severe and of long duration. The time was spent in increasing the entire military establishment on the front and (by the Italians) in preparing to meet an Austrian attack on the Trentino front, and in organizing an Italian attack in the southern part of the battleline. The plans of the Italian General Staff were as follows: First, to engage the enemy on the entire front from Tolmino to the sea in an intense artillery action which would leave him doubtful as to the real direction of the decisive attacks; then to attack on the right wing to the north of Gorizia, and, lastly, to strike out on the Carso.

Operations were begun on May 12, and on May 14, the infantry advanced from Plava and Gorizia. Initial successes were gained on Mount Cucco and Mount Santo. On the entire front the Austrians presented stubborn and determined resistance. The next day the Isonzo was crossed between Loga and Bodrez and new advances were made on the two mountains mentioned above, and on the Vodice ridge. By the 22d the advances were consolidated and the Italians had a firm grip on the whole mountainous ridge which separates the Isonzo from the deep valley which branches out in front of Anovo. The Italians had taken over 7000 prisoners.

In order to create a diversion the Austrians attacked in the Trentino region (May 19 to 22). Unsuccessful attacks were made in Val Sugana, on the Asiago plateau, around Lake Garda and in the Adige valley. A strong attack in force was repulsed by the Italians on the 22d, after temporary successes in the Piccolo Colbricon and in the Travnigolo valley. In these attacks the Austrians lost many men, killed, wounded, and captured.

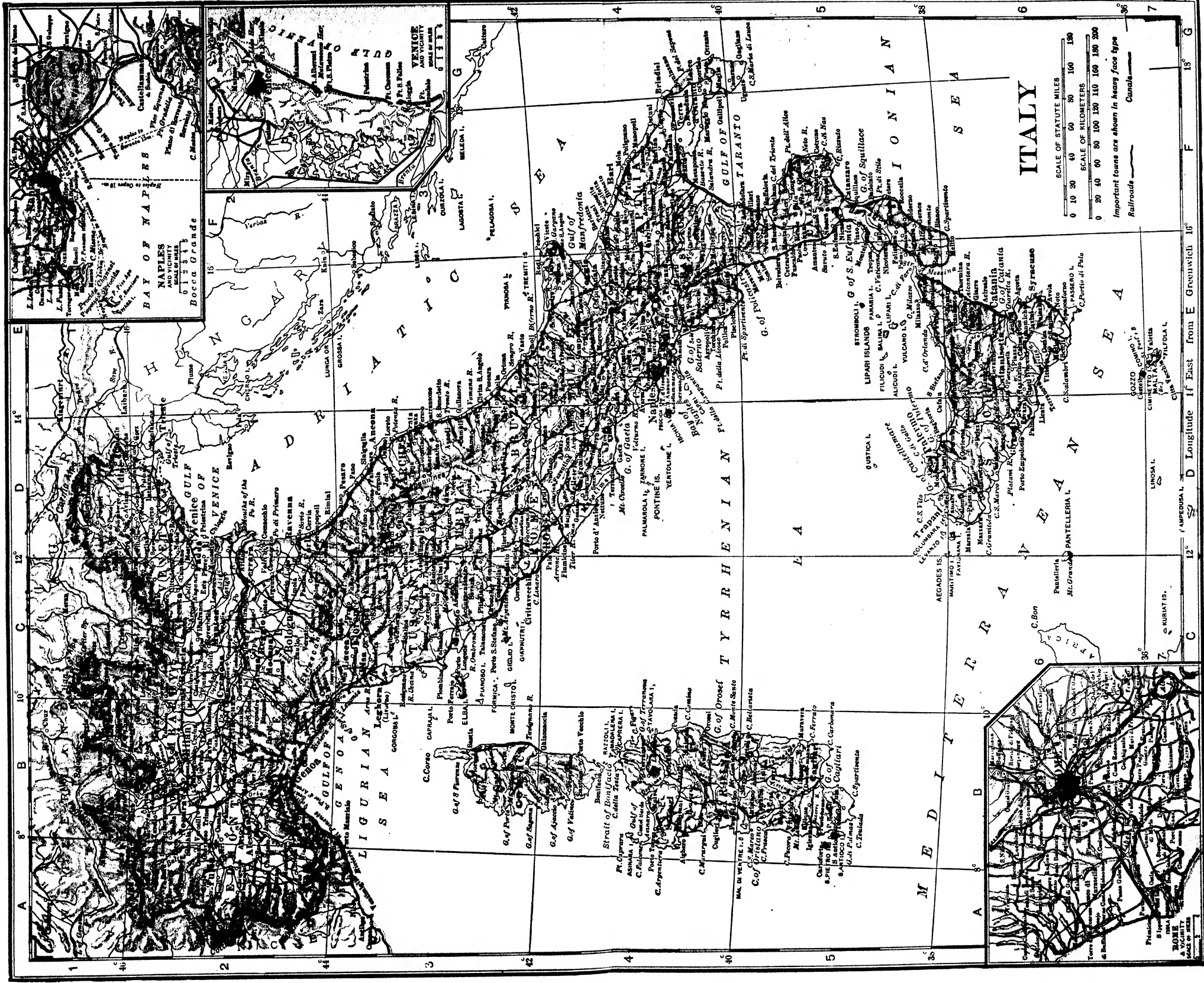
On May 23, the Italian infantry, after tremendous artillery preparation, attacked on the southern edge of the Carso Plateau from Castagnavizza to the sea. Over 100 aeroplanes aided in this battle. Lucati, Jamiano, Bagni, and several

important heights were captured. On the next day the battle was resumed and extended from Gorizia to the sea. Allied monitors bombarded the extremity of the Austrian lines with heavy naval guns. The Italians advanced in the face of exceedingly stubborn resistance—counterattacks, violent shelling, and aerial bombardments from machines flying very low to the ground. The Italians in this phase of the battle took 17,000 prisoners and 20 guns and were within 11 miles of Trieste.

The Austrians on June 1 began an offensive which compelled the Italians to retire somewhat from their newly won positions. On account of the conditions in Russia (see above) they were able to bring up great quantities of men and material from the Eastern front. On June 3, a general attack from Mount S. Marco to the sea was begun and lasted with unabated intensity for three days. It was at first successful. Italian positions on Mount S. Marco were taken and positions on Dosso Fatti were penetrated. South of Jamiano the Italians were compelled to give up a strip of territory which they did not have time to consolidate. A counter-assault by General Cadorna in the Trentino compelled the Austrians to give up this offensive which was supposed to neutralize the Italian gains in the latter part of May. There is no doubt that the fighting on the Carso favored the Italians in the first months of the campaign, although it is doubtful if they penetrated the Austrian lines as far as the General Staff had hoped.

During July and the first part of August the opposing forces battled back and forth in an attempt to get advantageous positions. The Italians advanced on the Carso and took Dalino, and repulsed strong Austrian attacks in the Trentino. The Austrian artillery was everywhere active, as thought it was attempting to prevent the Italians from organizing an offensive on a large scale. Nevertheless, on the night of August 18, the Italians began a spectacular offensive from Tolmino to the sea, a front of approximately 37 miles. The attack was made by the Third Army, under General Cappello, which operated on the Bainsizza plateau, Monte Santo, and Monte San Gabriele, and the Second Army, under the Duke of Aosta, which operated in the Vippacco and Brestovizza valleys, and in front of the Hermada mountains. These armies were aided by Italian and British monitors in the Gulf of Trieste and by vast fleets of aeroplanes.

The Italians paved the way for their advance by a great engineering feat. They had diverted the course of the waters of the Isonzo River from its bed above Anovo and had built bridges across the shallow stream that remained. This work was done at night, and at daylight the stream was re-diverted to its regular channel. By means of these bridges and some pontoon bridges hastily constructed the Italians crossed the river on the 18th and gained a foothold on the northern part of the Bainsizza plateau. At the same time General Cappello's right wing began to envelope Monte Santo. These two movements compelled the Austrians to retire to the easternmost edge of the Bainsizza plateau. The Italians captured a vast quantity of military stores and food supplies, besides a great number of prisoners. From the nature of the Austrian defenses, it was quite apparent that the Austrian Staff thought this plateau impregnable. On August 24, the Italians occupied the summit of Monte Santo, 2240 feet high, and on September the summit of Monte San



ITALY

SCALE OF STATUTE MILES

0 10 20 40 60 80 100 120

SCALE OF KILOMETERS

0 20 40 60 80 100 120 140 160 180 200

Important towns are shown in heavy face type

Railroads

Canals

Longitude if East from E Greenwich 16°

Latitude if North from N Equator 46°

Gabriele, 1700 feet above the Isonzo and 300 feet above Monte San Daniele. The Austrians still held the eastern slopes of Monte San Gabriele.

The Duke of Aosta had been busy in the south in the meanwhile. His object was to surround the Hermada mountains, which were the key to Trieste, and to occupy the Vipacco valley. In his assault on the Hermada he was aided to a large extent by monitors and aeroplanes. He was unable to break through the Hermada mountains, however, and spent the entire month in fruitless efforts. During September and early October, General Cappello succeeded in driving the Austrians from the slopes of Monte San Gabriele, and also made slight gains on the Bainsizza and Carso plateaus. The objectives of the Italian summer campaign were to capture ultimately Trieste and Laibach. The capture of the former would destroy the submarine bases in the Adriatic, and the capture of the latter would open up the way to Vienna. The sudden German-Austrian blow at the northern extremity of the battle-line compelled the Italians to give up their entire gains of the year.

Great Italian Retreat. — As has been described above, the main Italian army was striking on a comparatively limited front on the Bainsizza plateau. The entire line of action was scarcely more than 12 or 15 miles long. This attacking force was composed of seasoned veterans. The armies protecting its flank were of unequal strength and were used for different purposes. Those on the upper Isonzo were territorials, i.e., older men who in peace times are held in reserve. They extended from Tolmino to Plezzo (Flitsch) and were to protect the flank of the Bainsizza army. The troops on the lower Isonzo were veterans, who were thrusting forward on the Carso plateau *pari passu* with the troops on the Bainsizza, and who were ultimately to march on Trieste. The German General Staff had been receiving calls for help from the Austrians for some time and at last gave heed to them. The strategy of the German plan was to strike at the unseasoned troops on the upper Isonzo, break through, and then cut the lines of communications of the other two armies by outflanking them. This plan was put into operation and worked exceedingly well. The task was made easier by the collapse of Russia, a superiority of artillery, surprise, socialistic propaganda, and cowardice, which General Cadorna claimed was exhibited by his troops on the upper Isonzo.

The battle began on October 21, with a bombardment of the Plezzo-Tolmino front and the northern flank of the Bainsizza plateau. Under cover of these guns the Germans and Austrians broke through the front-line trenches at Plezzo and Tolmino and crossed to the western bank of the Isonzo. Converging from these points on Caporetto, the Germans opened the way down the valleys of the Natissone and Judrio rivers. This move threatened the rear of the Bainsizza and Carso armies, and compelled them to begin a hasty retreat. By the 27th Berlin announced the capture of 60,000 Italians (mostly noncombatants used behind the lines) and 500 guns. This was accomplished by the capture of Monte Matajur, which dominated the Italian rear down the valleys of the two rivers mentioned above. The retreat from the plateaus through Gorizia across hastily constructed bridges over the Isonzo became a rout. On the 28th Civadale was taken, which opened up railway communication with Udine, the seat of the Italian General Headquar-

ters. This advance also compelled the Fourth Italian Army, which was guarding the frontier in the Carnic Alps, to abandon the passes on the frontier and retreat down the streams flowing into the Tagliamento and Piave rivers.

On October 30 Udine fell, and by the first of November the Teutonic Allies had reached the Tagliamento River. The Italians, particularly the cavalry, fought valiant rearguard actions to stem the tide of invasion and hold the line of the Tagliamento. So far they had lost 180,000 prisoners and 1500 guns. The Germans couldn't be stopped. They crossed the Tagliamento in scores of places, increased their number of prisoners to 250,000 (German report), and the number of guns to 2300. The next river flowing into the Gulf of Trieste was the Livenza. This offered very little chances of resistance and was defended merely to give more time to prepare the line of the Piave River, from 10 to 20 miles further west. This line had been a training base for recruits and was protected by modern trenches and other fortifications. French and British infantry and heavy artillery, which was sorely needed, was arriving daily in ever-increasing numbers. At this stage a change in command was made. General Cadorna was succeeded by General Diaz, who was to be assisted by Generals Badoglio and Giardino. The Allied reserves were held on the Adige line in case the Italians were unable to defend the Piave. The Adige line was very strong naturally and was practically incapable of a flanking movement such as had won all the rivers so far gained.

The strategy of the Austro-German Staff was now to outflank the lower Piave line, which was fairly strong, by seizing the Asiago plateau and the hills between the Piave and the Brenta and coming down the Piave valley. They also attempted to cross the lower Piave at several points and were successful at Zenson and one or two other points. They were driven back at all of these except the first. The Teutons were at a great disadvantage because they were unable to bring up their heavy artillery on account of the destruction of the railroads. The extreme lower Piave was protected by great naval floats and the Italian fleet. A large area between Venice and the mouth of the Piave was flooded, which effectively prevented further crossings near the coast.

The Central Allies now concentrated their efforts to break through in the neighborhood of the Asiago plateau, the weakest point of the Italian line. They captured the village of Asiago and other more or less important points, but up to January, 1918, they were unable to break through to the Venetian plains. The Italians gradually withdrew in the region from Lake Garda to the upper reaches of the Piave in order to strengthen their positions for defensive purposes. They grimly held on to Monte Tomba and Monte Monferiera that guarded the gateway to the plains between the Brenta and the Piave rivers. Mass attacks comparable to those used by the Crown Prince at Verdun were repeatedly made on these mountain slopes, but the rock trenches of the Italians held firmly. These peaks are a part of a chain of low mountains which stretch across the plain between the Piave and the Brenta. For more than three weeks this mountain range was the scene of extremely bitter fighting. Intense artillery duels were fought, and the Teutons and the Italians took turns at the offensive. Each side won local successes but the main Italian line held.

The Germans and Austrians made another

great effort to break through in the first week of December, 1917. This time they struck between the Brenta and Astico rivers. The main attack was delivered on a four-mile front from Ronchi valley to Monte Kaberlaba after heavy artillery preparation. This was where the new Italian line was anchored to the line held before the great retreat began. The Italians were about to withdraw when the attack was made. In three days furious fighting (5th to 8th) the Germans took 15,000 prisoners. The Italians were forced back to positions more easily defended. Their line had been U-shaped and the bulge had been driven into a straight line. Their line was based on a group of low mountains similar to those between the Brenta and the Piave. The Austro-German troops took these mountains one by one. On December 15 they stormed Col Caprille and took 3000 prisoners. On the 19th they also stormed Monte Asolone and took 2000 more prisoners. They were now within four miles of the plains that would lead them to Venice and outflank the Piave line. With a desperation born of despair, the Italians counter-assaulted and regained the lost positions on Monte Asolone.

As 1917 closed the battle of the Piave was still in doubt. Military experts seemed to agree that the Italians would be unable to hold the Piave line and thus would be compelled to retreat to the Adige. The Germans had taken almost 4000 square miles of territory, 300,000 prisoners, and 2700 guns, according to reports from Berlin.

The Balkans. Serbia.—Serbia began her mobilization July 26, 1914, and two days later Austria declared war. There seems to be reason for the belief that Austria lost time in passing to actual hostilities. Apparently she could have seized Belgrade at once, and thus secured a footing on Serbian soil, some days before the Serbians were ready to strike back. She delayed, however, and when she did move, it was across the Drina, on the west. An invasion from the Drina would lengthen her lines, but if successful would enable her to strike at the heart of the country. The lack of good communications would tell on one adversary as much as on the other, and would be largely compensated by Austrian superiority in transport. Accordingly after demonstrations on the Danube, on August 12, she sent her first troops over at Losnitza on the Drina, on the same day she crossed the Save near Shabatz. Other troops crossed the Drina at Zvornik and Liubovia. The direct objective of the Austrians was to reach Valievo, and thence Kraguyevats, the site of the National Serbian arsenal. The commanding generals on the respective sides were Potiorek (Austrian) and Putnik (Serbian).

The line of the Austrian invasion being known, the bulk of the Serbians moved to meet it in the direction of the Jadar valley, while sending troops to the northwest to offset the invasion from Shabatz. In the meantime the Austrians moved up the Jadar, and the Serbians, or as many as had come up to join the sparse forces falling back before the advance, intrenched at Jarebitze, across the valley. The Serbian cavalry, sent to reconnoitre the Matchva plain, reported the Austrians present in force, and therefore received orders, with the Serbian right, to prevent the Austrians from the north from joining the troops that had crossed the Drina. The main body occupied positions extending well to the south of Jarebitze, while other forces were detailed to beat off attacks coming

from Krupani, 15 miles south, and from Liubovia, another crossing of the Drina.

The battle opened in earnest August 16, on the Serbian right. The action, lasting all day, resulted in the defeat of the Austrians, and in bringing to nought their plan to join their forces on the Jadar. It also left the Serbians free to operate against Shabatz. On the 17th they pushed on to within 4 miles of that town, only to find it strongly defended; they therefore abandoned, for the moment, any further active efforts and awaited reinforcements. On the centre and left, the Austrians had better fortune, and succeeded in pushing back their adversaries. This was particularly the case on the Serbian extreme left. But on the 17th, the Serbians resumed the offensive, and captured two positions in the Tzer. Further south, however, the Austrians were again successful, and drove back the Serbians, who however intrenched, ready to move forward again the next day. On the 18th, the Austrians advancing from Shabatz, drove back the Serbs in front of the town, and at the same time prepared to resist the expected Serb attack on Kosannigrad, their main position on Tzer. This attack was successful, and the Serbs then turned their efforts against an elevation between the two mountain ranges (Rashulatcha) which was taken the following day, the 19th, on which the issue of the battle was decided. The Austrian right was beaten on that day, and the Serbs were now in possession of Tzer and Iverak. On the 20th, the Dobrava was crossed, fighting continued on the 21st, 22d, and 23d; on the 24th, the Serbs entered Shabatz. While these actions were going on, the Austrians farther south had been retreating to the Drina, and the invasion had failed. The losses on both sides in the battle of Jadar were heavy, probably 35,000 killed and wounded Austrians and 18,000 Serbs. The Serbs took 4000 prisoners, and gathered in a considerable quantity of guns, rifles, and military stores generally.

On September 1, the Serbs invaded Syrmia, a province lying between the Save and the Danube. On the whole, this step was ill-advised, and in any case of short duration, for now the Austrians were about to launch another invasion, like the first, from the line of the Drina, under the same general. About five corps composed this invading army. The attack opened over the whole line from Liubovia on the south to Jarak on the north. North of Losnitza the Austrians fared badly, save that they managed to acquire a strip of the Matchva plain. South of Losnitza, however, they established their crossing and drove back the Serbs to a line about 10 miles from the river, where they intrenched. Here they turned, and drove their adversaries out of the position. But no decisive result was achieved by either side, for in this region both settled down to trench work. A struggle ensued, however, for the Guchevo mountains, equally indecisive, for they were held by both.

After six weeks of position fighting the Serbs retreated, abandoning the Matchva and the Tzer. The Austrians followed over the whole frontier, entering Valievo on November 11. The Serbs now took up a position down the Kolubara River to the Lyg, up which their line turned to the southeast; the heights south of this position were occupied and protected by earthworks. On November 11, the Austrians attacked towards Lazarevat, and a detached force

20 miles southwest guarding the valley of the western Morava. On November 20, the first of these attacks proved successful and drove in the Serb centre. By the 24th, the action had extended over the whole front with continued success falling to the Austrians, who later in the month got possession of the Suvobor mountains, dominating, as it were, the Serbian positions. They had now succeeded in extending their front to Belgrade, and had thus cut the region in two, driving back the Serbs in the direction of Kraguyevats, on a line from the Belgrade railway to the western Morava. The situation was now saved to the Serbs by a resumption of the offensive. On December 2, they attacked and, on the 5th, recaptured the Suvobor, and drove back the Austrian right and centre to Valievo. The advance was equally successful in the other sectors. Its result was an interposition between the three Austrian corps on the south and the two farther north. The three southerly corps retreated as well as they could on the frontier. The action now turned towards Belgrade, towards which the Austrians were steadily driven back. The evacuation of the capital occurred on December 14 and 15. Nearly 42,000 Austrians were taken prisoners; 60,000 were killed and wounded.

Bulgaria.—Serbia was once more in October, 1915, called upon to defend her territory, for Bulgaria had finally decided to cast in her lot with the Central Powers. Accordingly her armies crossed the Serbian frontier towards Nish, striking in conjunction with the Austro-German forces, which had already begun their invasion from the north. Meanwhile French and English troops, debarked at Saloniki, were hastening up along the Saloniki-Nish railroad. The importance of the new campaign centred in the strategic value of the railroad, as there was no other line from Austria to Constantinople that did not cross Rumanian territory. At Velika Plana, 25 miles from the Serbian frontier, the railroad forks, its two branches running respectively to Belgrade and to Semendria, with the latter route in the Morava River. It was up this line that the Austro-Germans advanced, after capturing Belgrade.

In the first week of October the Austro-German army, reported to be 300,000 strong, crossed the Danube near Belgrade and at Semendria, while other armies attacked farther west along the Drina and Save rivers. Among the commanders of the invading armies was Field Marshal von Mackensen, in command of the army east of Belgrade.

Bulgaria's first operations were directed towards Nish. But realizing the danger of the arrival of Allied reinforcements from Saloniki, the Bulgarians then developed their main attacks farther south against the railroad, at Vranja and Vilandovo. At the latter point, only five miles from the southwestern corner of Bulgaria, an army of 40,000 men threatened to cut the railway. Serbo-French troops, however, hurried up, and threatening the Bulgarian town of Strumnitza behind these troops, compelled them to fall back. At Vranja, however, some 60 miles south of Nish, the Bulgarians were more successful.

The advance of the Austro-German columns from the north was at first slow, for by the end of October they had gained, advancing on a 100-mile front, only from 25 to 40 miles south of Belgrade. Another column about this time

crossed the Drina River at Vishegrad, and constituted a new army of invasion. In the south, however, the Bulgarians having seized the Nish-Saloniki railroad at Vranja, promptly confirmed their grip on the enemy's line of supplies by taking the important junction city of Uskub, and Veles, 25 miles farther south. And in the meantime, their columns directed towards Nish were making progress, and Pirot, on the Nish-Sofia line, was stormed after a four-day battle.

The Germans took the Serbian arsenal at Kraguyevats during the second week in November. In the meantime, the other Austro-German columns had reached the east and west line of the Western Morava, at Krushevats at Kraljevo, before the middle of the month. The fall of Nish was not long delayed, upon a heavy bombardment by the Bulgars. A route to Constantinople had already been opened via the Danube, when Germans and Bulgars joined hands near Orsova.

Meanwhile the Anglo-French forces from Saloniki held the railroad from Krivolak south to the frontier, and had gained some successes against the Bulgars around Strumnitza. But these, moving with ease around the French left to the Babuna Pass, 25 miles west of Krivolak, swept aside the small Serbian defending force, and descended through the mountains upon Prilep and Krushevo. The French were scarcely able to maintain their position on the Vardar and Cerna rivers, and the small British force was but little in evidence north of Doiran. An Italian supporting army was rumored to be about to land at Avlona.

The remaining strokes in Serbia's defeat followed quickly. Sienitza, Novibazar, Mitrovitza (the last the temporary Serb capital) fell in rapid succession before the Austro-German columns. Teutonic and Bulgarian invading forces joined hands at Prishtina, on the railroad branch south of Mitrovitza, which surrendered with 10,000 men. On the last day of the month, the two remaining cities of importance, Prisrend and Monastir, were lost to Serbia. Sixteen thousand prisoners were taken at Prisrend; the rest of the fugitive northern army was driven either into Montenegro or Albania.

At the beginning of December the main object of the German-Bulgar campaign in Serbia had been achieved. The Serbian army had been eliminated as a fighting force and the surviving Serb troops, fewer than 100,000 men, driven into Montenegro and Albania, where they were pursued by the Austrians, against whom they could make no stand whatever.

The retreat of the Serbs from Katchanik left the French left flank, on the Cerna River, in a critical position. The retreat of the Allies, however, was skillfully conducted, and they succeeded in escaping to neutral territory, where they fortified themselves at Saloniki, with the intention apparently of holding their position at all costs. Montenegro was conquered by the Austrians in January. The capture of Mount Lovcen, dominating Cetinje, determined the fall of the capital. The Austrians then proceeded to take Scutari in Albania (Jan. 25, 1916), and joined hands with the Bulgars at Elbasan, east of Durazzo, on February 17. The Italians abandoned the place February 26, and the Austrians now advanced against Avlona. The remnant of the Serbian army was transported by the Allies from the Albanian coast to the Island of Corfu to undergo reorganization. After

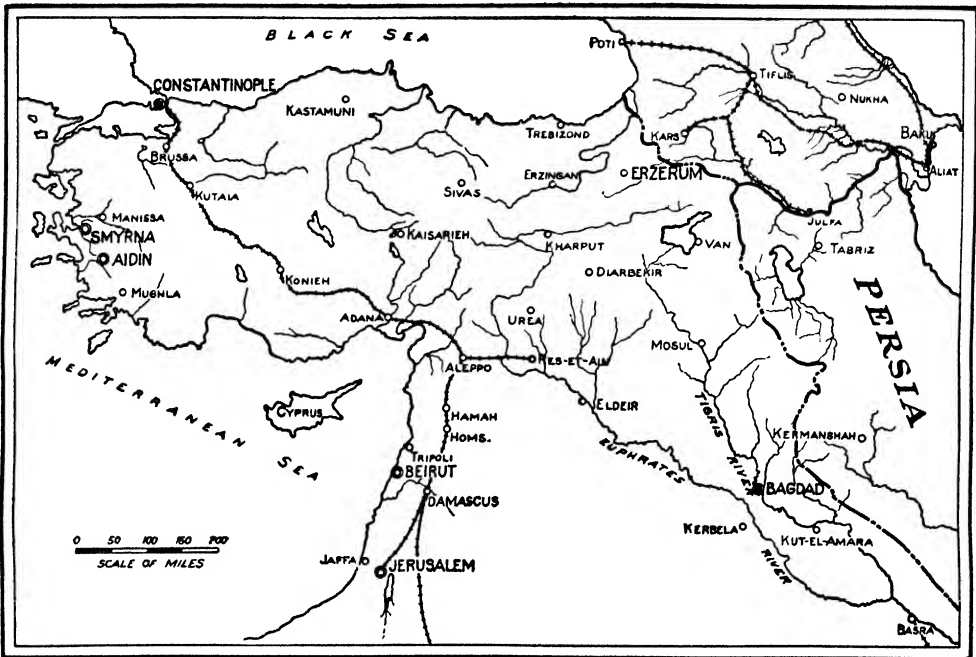
a few months' rest the refitted army of 100,000 men was taken to Saloniki to reinforce the French and British forces there and await developments in the Balkans.

The long-awaited Allied drive from Saloniki began on July 29, when the reorganized Serbian army began to move north. Within two days it was entrenched 300 yards from the Greek frontier. With the entrance of Rumania into the war, an Allied offensive from the Adriatic to the Aegean began (Aug.-Sept.). The Italians advanced in Albania, the French attacked from the Vardar to Lake Doiran, and the British crossed the Struma River and strongly entrenched themselves on the eastern bank. A Franco-Russian force advanced along the western bank of Lake Ostrovo and took Florina by assault on September 18. This opened up the road to Monastir, which was attacked by the French and Serbians about 15 miles northeast of Florina.

In the meantime the Bulgarians continued

important political success by capturing the city on Nov. 19. From a military point of view the victory was not so very important because severe weather prevented a successful pursuit. The entire front was quiet in 1917. The Allies' task was to move up the Varda, Struma, or Cerna valleys. This was made hopeless by the inactivity of the Russian armies. Local fighting occurred around Lake Doiran. The situation in Jan. 1918, was approximately as in Jan. 1917.

Rumania.—As has been stated above the question of Rumania's entrance into the war was settled on April 28, 1916. This new force added about 600,000 men under arms to the Allied cause and could increase this amount to 900,000 including the reserves. From the outset it was apparent that the Rumanian plan of attack was to invade Transylvania and thus attain the Rumanian ideal, i.e., to capture and hold the provinces of Austria-Hungary that were inhabited by Rumanians. As later events turned out,



their invasion of northern Greece. Early in September a Bulgarian force crossed the frontier and took the fort of Drama. The Greeks made only a slight resistance. Seres was then taken and the provisional government described above (*Outbreak of the War: Greece*) was organized. The port of Kavala, long desired by the Bulgarians, was next seized. The Germans claimed that the garrison asked them for food, shelter, and protection. The Greek soldiers were sent to Germany as guests of the nation in order not to violate Greece's neutrality. The fall of Kavala completely cut off the Greek soldiers in the far eastern part of Macedonia.

During the month of October the entire Allied line advanced. The Italian forces in Albania joined those of General Sarraile and thus prevented any attempt to envelop his army. The Serbians continued their advance and stormed Kitchiev on the 1st. They then crossed the Cerna and broke through the Monastir defenses. With the aid of the French they won a very im-

portant political success by capturing the city on Nov. 19. From a military point of view the victory was not so very important because severe weather prevented a successful pursuit. The entire front was quiet in 1917. The Allies' task was to move up the Varda, Struma, or Cerna valleys. This was made hopeless by the inactivity of the Russian armies. Local fighting occurred around Lake Doiran. The situation in Jan. 1918, was approximately as in Jan. 1917.

The geographical features of Rumania were to play an important part in her campaigns. In general the shape of the country is like a large Y. The bottom of the Y is bounded by the Black Sea and the two arms are bounded across their mouth by the Austro-Hungarian province of Transylvania. Russia is on the north and Bulgaria is on the south. The Alps (in Transylvania) and the Carpathians form formidable natural barriers. The Danube forms another natural boundary on the south for a part of the distance, but the acquisition of Bulgarian territory at the close of the Balkan Wars added a strip of territory bordering on the Black Sea which was peculiarly vulnerable. It later proved that this was going to be the point of Bulgarian attack and the starting place of the great German drive which ultimately resulted in the complete overrunning of the country.

Immediately after the declaration of war the Rumanian forces swept into Transylvania with all the vigor a new army on its first campaign

possesses. The first objectives were the two Transylvanian cities of Kronstadt and Hermannstadt just across the border. By the end of August both of these places had been captured with very little opposition. The Rumanians continued their impetuous advance apparently not taking into consideration the distance they were traveling from their base and also not considering their weak defensive line on the south. After the fall of Kronstadt they immediately struck west towards the coal fields. Another army, however, had crossed the Vulcan Pass and had captured Petroseny in the centre of these fields on August 31. A third army captured Orsova on September 1, after five days of the heaviest fighting the campaign had yet seen. On September 9 the Rumanians captured six more small villages and now held in their possession nearly one-fourth of Transylvania.

The campaign now assumed such serious proportions that Von Hindenburg was sent down with 450,000 men to check it. The Rumanians were not able to make any headway against the new enemy. They were forced to give up the Szurduk Pass and after the capture of Petroseny were forced to give up the Vulcan Pass also. The check, however, was only temporary, inasmuch as in the middle of September another offensive on a large scale was begun west of Hermannstadt. It succeeded in driving the Teutons out of both the Szurduk and Vulcan passes. It then pushed on into the Jiu valley.

This marked the high tide of the second Rumanian invasion, since the Rumanians suffered a severe setback at Hermannstadt. The victory won here by the Austrians and their German Allies was one of the greatest of the war. The battle raged four days and resulted in the complete annihilation of the first Rumanian army. The German army was divided into two parts. The first attacked the Rumanian front at Hermannstadt while the second by a rapid enveloping movement came up in the Rumanian rear and cut off their only line of retreat, through the Red Tower Pass. The fleeing Rumanians were swallowed up when they came to this pass by a large force of Bavarians. Von Falkenhayn now stood at the entrance to Rumania without being opposed by any real army. The second Rumanian army tried to save the precarious situation but came on the scene too late and was checked everywhere on a 50-mile offensive. The remains of the first army fled in great disorder through the Carpathians to the east and west of the Red Tower Pass.

Rumania was now threatened from another quarter, on the south. The forces in this sector were entirely insufficient to withstand the attacks of the Allied Bulgar and German army. The expected Russian reinforcements failed to arrive on scheduled time and another great drive similar to that in Serbia was begun. It entered the Rumanian territory in two columns. The first under Von Mackensen entered the Dobrudja and captured Tutrakan on September 3. The garrison of 20,000 men was forced to surrender. On September 10 Mackensen took a second large fortress, Silistria, which lies on the south bank of the Danube. The garrison of this fortress had been defeated by the Bulgarians in an attempt to relieve the fortress of Tutrakan.

The second invading column attacked along the coast of the Black Sea. It captured Dobric and the seaports of Kali Akra, Baltjic and Kavarna. The arrival of a Russian force, how-

ever, compelled the invaders to give up all of these places with the exception of Baltjic. The battle on this front now settled down into trench warfare with the Rumanians holding a strong position extending from the Danube to the Black Sea.

Rumania was now like a nut in the jaws of a nutcracker. Von Falkenhayn was pushing on from the north and Von Mackensen from the south. It was almost inevitable that she was to be crushed even as Serbia had been. Russian reinforcements had been sent to strengthen the Rumanian line but they only succeeded temporarily. The Grand Duke Nicholas was placed in charge of these forces and he was also military adviser to the Rumanians. In the middle of October, 1916, King Ferdinand of Rumania took personal command of the Russo-Rumanian army.

In the north the Germans pushed their way through the Vulcan Pass, having taken it by storm. Gradually Von Falkenhayn succeeded in pushing the Rumanians completely off the Transylvanian Alps. They also advanced further south of Kronstadt towards Kimpolung and the Sinaia, the Rumanian summer capital. They now had a grip on the railroad which ran to Craiova and then to Bucharest. By the last week in October Von Falkenhayn had reached Azuga, which was only 7 miles from Sinaia and almost on the border of the Rumanian oil fields. He also threatened to envelop the Rumanian army which still held Orsova. The Russians and Rumanians now made a strenuous effort to stop Von Falkenhayn's advance. They started an offensive on the Moldavian frontier, which while it lacked power at least held open the rail communication with Russia. In the region around Kimpolung and south of the Vulcan Pass the Rumanians not only checked the Germans but succeeded in pushing them back. By the end of October they had forced them back to the frontier in the neighborhood of the Szurduk Pass.

The trench warfare which existed in the southern sector was broken by Von Mackensen in the third week of October. On the 23d of this month he took Constanza and two days later the very important city of Cernavoda. This was the Danube bridgehead which controlled the railway to Bucharest. Constanza was the port of entry for Russian troops and supplies, sent to assist Rumania. Besides this Constanza was the largest seaport Rumania had and was the base of its Black Sea fleet. At Cernavoda the railway from Constanza to Bucharest crosses the Danube. This bridge is of immense size, being 11 miles long. The other side of it from Cernavoda crosses great swamp lands. The Germans did not immediately attempt to cross this bridge and pursue the Rumanians towards Bucharest. Instead they followed up the coast line of the Black Sea. On October 27 Mackensen seized the city of Hirsova. He had an opportunity to cross the Danube here by pontoon bridges, since the ground was not so marshy as it was in the vicinity of Cernavoda. By this time the flight of the Slavic Allies was precipitous and they did not attempt to hold any defensive positions. By the end of October Mackensen had established his line well north of the Constanza-Cernavoda railway. An attempted Rumanian offensive through Bulgaria in order to attack Mackensen's rear failed and the Rumanians were forced to retire to their own territory.

In the early part of the month of November

the Russians and Rumanians made strenuous and for a time successful efforts to stem the tide of German invasion. Their main aim was to save the Cernavoda bridge. When they retreated across this bridge they had destroyed only a few spans of it and evidently they were easily replaced by the Germans. In the north the Slavs were also temporarily successful, but were unable to withstand the Teuton push.

Von Falkenhayn's troops were pushing south through the Predeal, Vulcan, and Rothenthurm passes and were advancing down the Alt and Jiu valleys. They captured Tirgujiul and Liresht and then swept across the plains of Wallachia. A simultaneous movement was started in the extreme western part of Rumania near the Iron Gate. The object of these two drives was to capture Craiova, the capital city of western Wallachia. After administering a severe defeat to the Rumanian army, Von Falkenhayn took this place on November 20. He immediately fortified it strongly in order to have a base of attack on Bucharest. The Rumanians made preparations to hold the Alt valley as a defensive line. Mackensen activities in the south, however, prevented this.

He forced the crossing of the Danube at Zimnica, a spot where the river is both wide and deep. This threatened to cut the Rumanian line of communications and as a result the Alt River line was abandoned. The Vedeia River was next chosen as a defensive line, but this also had to be abandoned because the Germans crossed the Danube at another point and cut the railroad which supplied the Vedeia line. The Rumanians again started their retreat towards Bucharest. At each of the small streams the Germans had to cross, however, their defense stiffened, but never sufficiently to stop the invading forces. By the end of November the Germans had reached the Arges River, the last river of any size between them and Bucharest. The fall of the capital was now almost a certainty and the Rumanian government was moved to Jassy on the 29th.

The attack on the capital city was made from the north and south. The real danger to the city was from the north. The Rumanians made their last stand on the Averescu. The Germans, however, swept down from south of Kronstadt and crossed this stream themselves and after several victories captured Bucharest on December 7. On the same day Ploesci, in the centre of the oil district fell. The Germans then drove the fleeing Rumanians across the Jalonitz River and captured Mizil on the 12th and Buzeu on the 15th. The Slavic Allies retired to the Rimnik-Sarat River, which they managed to hold for five days. This enabled them to remove their supplies to Braila. The Germans forced the passage of the river on the 27th and pushed the enemy into Braila.

The Russo-Rumanians made a strong stand at the Matchin bridgehead, on the Danube. This really controlled the way to Braila. Nevertheless, in the face of a heavy artillery bombardment they were forced to retire from the bridgehead on Jan. 3, 1917. This cleared the Dobrudja of Russians and Rumanians with the exception of a small neck of land which extended towards Galatz. On January 5, Braila, Rumania's chief commercial city, fell into the hands of the Germans. The Slavic Allies were now completely driven out of the Dobrudja. The Russians were forced to cross to the north bank of the Sereth.

Fokshani fell on the 8th. A new line, formed on the Putna, had to be abandoned on the 10th. Vadani, 6 miles from Galatz, was captured on the 14th, but was recaptured on the 17th. Bitter fighting ensued until August, 1917, when the German drive was stopped. The line ran south of Galatz, then northwest along the Hungarian border to the Pruth, east of Czernowitz. The Teutons held all Rumania excepting part of Moldavia. Exposures made by the Russian revolutionists showed that Rumania was betrayed by Stürmer, the Russian Premier. The promised Russian protection on its flank had been withheld. The Rumanians entered an armistice with the Teutons in Dec. 1917. See *Eastern Theatre*.

V. Southeastern Theatre. The strategic importance of Turkey from the Germanic point of view lay in keeping supplies from Russia through control of the Dardanelles. Turkish military activity manifested itself on four distinct stages. 1. Caucasus. (a) Turkish thrust against Russia (1914-15); (b) Russian campaign (1916) forcing Turkish armies behind Trebizond, Erzerum, and Bitlis line to the west, and threatening Bagdad to the south. 2. Gallipoli campaign by Franco-British forces. 3. Turkish attack on Suez Canal. 4. British advance on Mesopotamia.

Turkey, Caucasus, Egypt.—War was declared between Russia and Turkey on Oct. 30, 1914, and between England (and France) and Turkey on Nov. 5, 1914. But at the end of July, 1914, Turkey had already begun to mobilize; by the end of October it was estimated that she had some 500,000 men in her army with 250,000 more at the depots.

These troops were concentrated in three principal groups; near Constantinople and in Asia Minor, in the Caucasus, and in Syria. The Turks under Enver Pasha, at once opened a winter campaign in the Caucasus. Here, indeed, they had been anticipated by the Russians, who, crossing the frontier, captured, on November 13, a position near Koprukeui and Erzerum. From this they were compelled to withdraw, but returning to the attack recaptured the place November 20. What had been intended as a mere demonstration by the Russians was converted into a serious matter by the initiative and energy of the Turks. The Russians would naturally advance by the Kars-Erzerum road. Hence the Turks purposed to hold the Russians on this road, while making an enveloping movement on the left against Kars and the Russian right. This plan came near succeeding. The Russians were pushed back from Koprukeui to Khorosan and were driven out of Ardahan on January 1. Two Turkish corps reached Sarikamish, the Russian railhead south of Kars, on December 25. But the weather and the season, together with the natural difficulties of the country, brought the plan to naught. One of the two Turkish corps was driven back from Sarikamish (January 1) and the other dislodged on the 3d. Ardahan was recaptured. The remaining body at Khorosan surrendered. Two Russian columns that had crossed the Turco-Persian frontier reentered Tabriz, which had been occupied by the Turks early in January, on January 30. Relieved from command in Europe and sent to the Caucasus, the Grand Duke Nicholas inaugurated a midwinter campaign, 1915-16, with an army estimated at 300,000 men. On Feb. 16 he took Erzerum with 13,000 prisoners. The part of the garrison that escaped fled to Trebizond, to

the Van region and elsewhere, with the Russians in pursuit. One column captured Bitlis on March 3, and advanced south in the direction of Sert. Another column marched on Erzingan. In the direction of Trebizond the Turks were defeated at Kara Dere, and Trebizond itself was taken April 20-21. A Turkish attempt to turn the Russian left in the neighborhood of Trebizond was checked, and the Russians continued their march westward. Baron von der Goltz was in command of the Turkish troops. Two flying detachments in Persia carried on operations, one in the Urumiah district, the

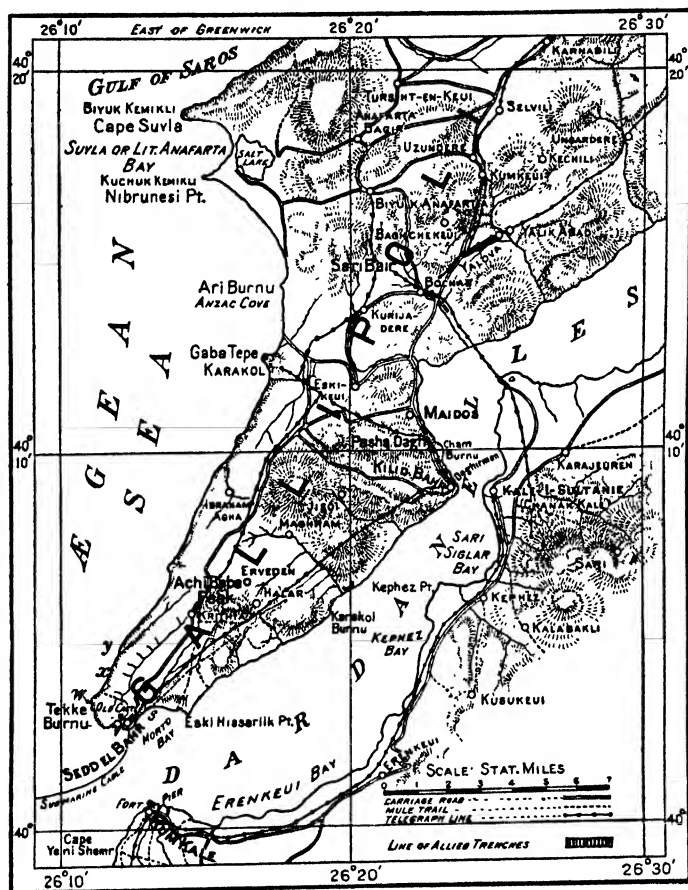
into three columns. The northerly one, of about 6000 men of all arms, followed the caravan road from Rafa to El Kantara; the southerly, of 3000, the pilgrim road from Nakhl to Suez; the middle column, that from Kossaima to Ismailia. This last road happened to be practicable at this time because a rainfall had filled a pool on the line. Pontoon boats accompanied the expedition, whose march was well organized and well carried out. On January 26 the advance guards of the south and middle columns were reported near the canal. The Turks were completely beaten (February 2-3). The main attack (Tussum-Serapeum) was made

by the middle column; that of the southerly (Suez) was a fiasco; the northern made a better though vain effort (Kantara); on the night of February 6-7 a general retirement began.

The next serious threat on the canal was made in August, when the Turks attacked the British positions at Romani. The British gave way before a strong frontal and flank attack. Thinking they were retreating, the Turks sprang forward in pursuit order, and soon were lost in the dunes. Then the entire British front attacked and completely routed the Turks, driving them over 6 miles to a position east of Birs-el-Manca. Many guns and 2500 prisoners fell to the victors. In December the British captured El Arish and the strongly fortified position of Maghdabah. These victories effectively stopped further threats of raids on the canal. On Jan. 11, 1917, the British took six lines of trenches and 1600 prisoners at Rafa, on the Sinai peninsula.

Dardanelles.—The Turkish arms thus came to grief in both the Caucasus and in Egypt. Better fortune waited upon them in the Dardanelles. The temptation to strike a blow at the vitals of Turkey by taking possession of the Dardanelles, and hence of Constantinople, was irresistible. Success here would have met with a rich reward. A way would have been opened to supply Russia with the war munitions she so sorely needed; the Balkan question would have been settled out of hand, and in a manner favorable to the Allies. But the entire campaign was mismanaged from the outset; the nature of the effort to be made was certainly not correctly estimated; efforts were scattered, time was lost.

For the naval campaign, reference should be made to the naval subdivision of this article. It opened on Nov. 3, 1914, and it was not until the following March that joint land and naval operations were decided upon. By that time the Turks had received ample warning, and here, as elsewhere, under German leadership, had made what turned out to be more than ample preparation.



other from Kerman-Shah, taken by the Russians, towards Bagdad.

Simultaneously with the original Caucasian campaign mentioned above an expedition under Djemal Pasha was undertaken against the Suez Canal. The importance of this waterway to the Allies is self-evident. In anticipation of an attack upon it, troops had been collected in Egypt, consisting chiefly of East Indians and Colonials, with a few Imperial service units. In the canal itself several French and English warships took position to assist in the defense. Moreover, during the autumn and winter the position had been thoroughly strengthened by modern field fortifications; the defenses consisted of bridgeheads on the east covered by intrenched positions on the western bank at El Kantara, El Ferdan and Ismailia, Tussum and Serapeum, Shaluf and Kubri.

Djemal Pasha formed his forces of 30,000 men

In the Gallipoli peninsula nature was on the side of the defense. Furthermore the Turks enjoyed an advantage in their supply of men, for the bulk of their forces were in the neighborhood of Constantinople and could therefore be drawn on as needed. Gen. Sir Ian Hamilton was selected to direct land operations for the Allies. These were to be carried on by a French force under General d'Amade, drawn from north Africa, and by Colonials, Territorials, and some Indians from Egypt and Imperial troops.

On arriving at Tenedos (March 17), selected as his headquarters, Sir Ian made up his mind that the transports had been so badly loaded that he would not undertake any operations until the loading had been corrected. The transports were accordingly sent back to Egypt to be reloaded. Upon their return, five weeks had been lost to the Allies and gained to the Turks.

The British began their landing on April 25. How strong the force of the Turks was is not accurately known; it must have been well over 100,000. The German General Liman von Sanders had been appointed commander in chief of the Turkish forces at the Dardanelles. The chief landings were made at the tip of the peninsula. Once ashore, the advance was to be made against the village of Krithia, and the height of Achi Baba was then to be carried. At each of the beaches selected, the Turks were ready and received the landing party with tremendous fire. The Australian and New Zealand corps ("Anzac") near Gaba Tepe especially distinguished themselves by rushing the opposing Turks with the bayonet, clearing the slopes and securing a foothold on the top. The French landed a regiment on the Asiatic side, near Kum Kale, for the purpose of preventing an attack by gunfire against the transports at the base of the peninsula. In this they were more or less successful, but at considerable loss to themselves. The result of the work of the 4 hours was that the Anzacs, isolated, were holding a semicircular line against an enemy ever increasing in numbers, other landings were abandoned, some forces were holding their own but isolated, while other landing parties had managed to join hands. The next three or four days were marked by severe fighting and an advance of the British from the southern beaches. By the afternoon of April 28 some of the troops had pushed up to within 1300 yards of Krithia, but could get no farther. The lines then dug in. On May 1, the Turks attacked at night, and there was a counterattack the next day. This is the first so-called battle of Krithia. The second occurred on May 8, and was an attempt to win the Krithia ridge; his attempt failed, but the British advanced their lines 500 yards. The third came off on June 4, with the same objective and the same result. The fourth was fought on July 12, and resulted in an advance of 300 yards more or less. Achi Baba still remained in Turkish hands. Meanwhile, the Turks were attacking the Anzacs (May 5-10) and were repulsed. They renewed their efforts in great force May 18, and were again beaten off with great loss. There were other engagements, as that of the French (June 21) who captured a work known as the Haricot Redoubt, and the English action of June 28, known as the battle of the Gully Ravine. And so it went until fresh British forces were landed at Suvla Bay on August 7, and the Anzacs advanced upon the ridges of Sari Bair.

But before the landing at Suvla Bay, the Allies on July 12 made a fresh attack in front of Krithia. It resulted in the capture of trenches and was followed on the next day by another general attack, resulting in a similar capture. But no really significant success was obtained.

The Suvla Bay landing and simultaneous operations at the tip of the peninsula and by the Anzacs constitute the last great attempt to drive the Turks off the peninsula. Sir Ian Hamilton in May had asked for two additional corps. By the end of July he got them. His plan was now to reinforce the Anzacs and direct them to make a drive to capture Sari Bair. A landing at Suvla Bay would surprise the Turks, and might enable the Anzacs after taking Sari Bair to push on to Midos. The Turks at Krithia and on Achi Baba would thus be cut off. A containing attack was to be made at the tip of the peninsula. This attack was delivered on August 5 and failed. It was renewed on the 7th and resulted in minor local successes; its main purpose of keeping the Turks busy on the spot, and then preventing them from lending a hand elsewhere, may be said to have been realized. The Anzacs, reinforced, attacked on the 6th, and very nearly succeeded in their purpose; but on the 9th an assaulting column lost its way, and so arrived too late to clinch the positive gains already made on the spur to the southwest of the main elevation (Hill 305) of the Turkish position. During the attack on Sari Bair the landing at Suvla Bay was begun August 6 by night under the direction of Lieut. General Sir F. Stopford. It resulted in failure, for although the troops got ashore, yet once there they accomplished nothing. Apparently there was no well-thought-out plan of operations, or if there was, it was not carried out. Some of the troop units were landed at places other than those designated, others were late in moving out. Some local successes were obtained, however, and on the evening of August 7 the British extended in a semicircle around the bay. On the 8th the British stood fast and made no attempt to advance, and so lost their opportunity not merely to accomplish something on their own account, but to help their comrades farther south engaged in the desperate struggle of Sari Bair. The enemy were fewer in numbers than the British and were not in heart. The responsibility for the inaction of the 8th must rest with General Stopford, but Sir Ian Hamilton must come in for some part of the blame. There was more or less fighting during the next week; on the 15th General Stopford turned over the command of his troops to General de Lisle. Open fighting gave way to trench work. There was one more battle on August 21, when an attempt was made to take Hill 100, about two miles east of Suvla Bay. Sir Ian Hamilton was recalled in October, and the whole peninsula evacuated in December and January. See SIDD EL BARR KALESI.

Mesopotamia.—The long-standing conflict between British and German interests in the Persian Gulf cannot be said to have had any immediate military bearing on the decision of the British government to open a campaign in the Mesopotamia. British interests, however, called for protection, and in particular the plant of the Anglo-Persian Oil Company on Abadan Island, with its 150-mile long pipe line, and the oil fields at Ahwaz on the Karun River. This

plant, intended to furnish fuel oil for the royal navy, was an enterprise in which the government was financially interested. Moreover, a successful campaign in the great valley would hurt Turkey's standing in the Mohammedan world, and from purely a military point of view would prove of assistance to the Allies. A small force had been sent to the Gulf before the outbreak of hostilities. On November 7 it reached the mouth of the river and took a small village, Fao by name, three miles up. Thence the expedition moved up river to Abadan, for the protection of the works already mentioned, and November 11 had a brush with the Turks on the Turkish side of the river at Saniyeh. Reinforcements joined this column on the 15th, and the combined forces, after some minor engagements, on November 23 entered Basra after its evacuation by the Turks; and on December 9, after getting into the rear of Kurna, received the surrender of its garrison, 50 miles up river. The British now took up an intrenched position astride of the river, and perhaps might have been content merely to hold the road down to the sea if it had not been for the Turkish counteroffensive in April, 1915.

Early in January of 1915 the Turks were found to be holding a strong position north of Mezera. An expedition drove them out of their lines. They next appeared at Ahwaz up the Karun River. A reconnoissance showed them to be in strength, and it was evident that they were contemplating an attack on the main British position. This attack occurred April 11-12 at Kurna itself, Ahwaz, and Shaiba. The action at Shaiba lasted three days and resulted in a serious Turkish defeat. During May but little happened, but on May 31 the British moved out and proceeded up as far as 75 miles from Kurna. From Amara a road runs to Ahwaz, the control of which assured the security of the oil region. The Turks had in the meantime withdrawn to Kut-el-Amara, 150 miles up the Tigris.

On May 31 a Turkish force north of Kurna was dispersed; on June 3 Amara was occupied. The Turks withdrew to Kut-el-Amara. From the Tigris at this point a cross river runs almost due south to join the Euphrates at Nasiriyeh. Unless this cross river were in British control the Turks could use it to menace the British left. Hence a force was sent against Nasiriyeh and on July 24 captured the place, the Turks retreating towards Kut. Early in August General Townshend went up the river marching on Kut, and on September 25 contact was made. A battle was fought on the next two days, and at dawn on the 29th it was discovered that the Turks had evacuated the position of Kut-el-Amara and retreated on Bagdad. They were pursued and considerable loss inflicted on them. By September 30 General Townshend was within 100 miles of Bagdad by road and 200 by river. He continued his march, and at Ctesiphon, about 30 miles down river from Bagdad, fought, November 22-25, an indecisive battle against superior numbers. At first victorious, he was compelled in consequence of his lack of reserves and his shortage of ammunition to fall back in the face of Turkish reinforcements. He retreated to Kut after having lost about one-fourth of his total 20,000 men. Here he intrenched and was besieged by the Turks.

All attempts to succor him having failed, and his supplies being exhausted, General Townshend on April 30 was compelled to surrender

to the Turks, after a gallant defense protracted for 143 days. This surrender simply meant that the ill-advised expedition against Bagdad had failed; it was still the fact that the original purpose of the Mesopotamian campaign had been fulfilled. General Aylmer's relief expedition, setting out Jan. 6, 1916, after defeating the Turks in two battles, managed, January 21, to reach a point only eight miles from Kut-el-Amara. But floods now came to the Turkish rescue and Aylmer was forced to fall back. He set out again in February, better equipped with boats, and after meeting with a reverse at Felahie defeated the Turks at Umm-el-Heuna, April 5; the next day the capture of Felahie was announced. He was now within 23 miles of Kut; but the Turks in the meantime had occupied strongly intrenched posts to dispute any further advance, impeded as before by floods. Much fighting took place, and although some ground was gained the relief force was unable to gain any decisive success. General Aylmer's forces continued to hold their lines in the neighborhood of Kut during most of 1916. In December, 1916, and January, 1917, there were several engagements of a local character in the neighborhood of Kut-el-Amara.

In February, 1917, the Mesopotamian campaign again began to assume importance. As a result of local engagements and maneuvering for position the British by the middle of February had established their line on both banks of the Tigris, where it formed a bend west of Kut-el-Amara, and consequently hemmed in the Turks in this town. On February 23 bodies of British troops were ferried across the Tigris under the protection of artillery and machine-gun fire. These troops cleared the opposite bank sufficiently to enable General Maude to erect a pontoon bridge. By the next day part of the Shamrun peninsula and Sanna-i-yat were seized. The taking of these important positions compelled the Turks to abandon Kut-el-Amara and to retreat toward Baghela, 24 miles up the river.

The British cavalry followed the fleeing Turks on their right, the infantry their centre and gunboats on the Tigris their left. The last-mentioned forces caused considerable havoc among the Turks, by getting ahead of them and firing upon them as they advanced. The British left wing under Sir Percy Lake, crossed the Tigris below its junction with the Diala and marched on Bagdad, 20 miles away. On March 10, an attack on Bagdad from both sides of the river drove the Turks back on the city itself. During the night the Turks evacuated the city and left the British artillery captured at Kut-el-Amara and the greater part of their own. The fall of Bagdad was not of great strategic importance but had a great moral effect throughout the world. Besides that the entire cultivated lands of Babylonia fell into the hands of the British. A Russian offensive drove the Turks from Hamadan and gave promise of a Russian-British advance which would completely occupy Turkey in Asia. The Russian revolution upset these plans and enabled the Turks to withdraw troops from the Armenian front to stem the British advance. During June and July the Turks drove the Russians across the border into Persia and left the British left wing in a very exposed position.

After the fall of Bagdad the Turks retreated up the Tigris toward Mosul and up the Euphrates toward Aleppo. The main body took

first route with the idea of holding the headwaters of the Diala until they could rescue their army which was practically lost in Persia as a result of renewed Russian activities. The latter had crossed the border of Persia again and had joined with the British outposts. General Maude seized Feluja on the Euphrates with the general purpose of ascending that river and capturing El Deir which was the key to the crossroads leading to Damascus, Aleppo, and Mosul. The plan was to have the centre advance on Mosul, the right wing to clear the caravan route into Persia and the left wing to secure El Deir. The first step accomplished in this advance was the capture of Samara on April 23. This put the Samara-Bagdad railroad in the hands of the British and facilitated the bringing of supplies from the latter city. The British right flank was left in an exposed position again by the complete downfall of the Russian armies and the reoccupation of Khanikan by the Turks (July) on the Persian border. This town controls the caravan route from Bagdad to Kermansha.

A word or two should be mentioned here of the revolt in the Hejaz (q.v.), which declared its independence under the leadership of the Grand Sherif of Mecca, Hujayn Ibn Aly, who took the title of King. This revolt was engineered by the Entente Allies and won over the orthodox Arabs and the Syrians opposed to Turkish rule. Arms and ammunition of the latest type were supplied to the revolutionists and they took several Turkish towns and seriously hampered the Syrian railway system of the Turks.

When fighting could be resumed, after the heat of the summer, the British on September 30 captured Ramadie on the Euphrates and the entire army of Ahmed Bey. This followed the brilliant storming of Mushaid Ridge on the previous day. On October 5, the Russians took by assault Nereman, 50 miles north of Mosul which was now seriously menaced. The British were within 100 miles of it on the south. They advanced still further when they took Tekrit 15 miles north of Samara. Operations halted here again for a long time because of the final collapse of the Russian forces with the consequent exposure of the British right wing. General von Falkenhayn, who had won such a great reputation for himself as Chief of Staff in Germany and as a commanding General in the Rumanian campaign, was now sent to Asia Minor to command the Turkish forces and spent the rest of 1917 building up the Turkish forces at Aleppo. He succeeded General von der Goltz, who had been assassinated.

The 1917 Campaign in Palestine.—As was stated above (section *Turkey, Caucasus, Egypt*) the British began an advance on Rafa on the Sinai peninsula in January, 1917. This town fell early in February and the British advanced northward toward Gaza and eastward toward Beersheba. They were compelled to spend the summer on the Gaza River after failing to take these places. In October they started forward again and by January, 1918, had won a series of brilliant successes. On October 31, Beersheba was taken in a sudden assault and on November 6 Gaza fell. By November 15, General Allenby had cut the Jaffa-Jerusalem railway at Ludd and Er Ramle. Two days later Jaffa, the port of Jerusalem was occupied. The British advanced down the Surar River valley toward the Holy City and up the Damascus-Beersheba rail-

way in order to encircle the city and cut off its supplies, so that it would not come under the bombardment of the artillery. All the towns surrounding the city were gradually taken by storm and as the British closed in it became apparent that the Turks would not risk a siege. The city fell on December 10. There was general rejoicing throughout the world over the return of the city to Christian hands after having been in Turkish hands for almost seven centuries. The Turks west and northwest of the city broke up into small bands and carried on guerrilla warfare until the British finally got control of all the high land. General Allenby then pushed across a small stream 4 miles north of Jaffa and captured several small towns which gave him all the high land in the neighborhood, and assured a good defense of the Jaffa-Jerusalem railroad.

The success of the British arms in Palestine effectively put an end to Turkish threats on the Suez Canal and Egypt which had been going on for three years. It also revived the hopes of the Zionists, who dreamed of a reestablishment of the Jewish nation in Palestine. The British government announced on several occasions that it looked with favor on the Zionist movement.

Colonies. Africa.—As early as August 7 the British Imperial government telegraphed the South African government to suggest the desirability of seizing such parts of German Southwest Africa, "as would give them the command of Swakopmund, Luderitzbucht, and the wireless stations there or in the interior." But before operations could be carried on against German territory the local government found itself face to face with a rebellion in sympathy with, if not inspired by, Germany, and having for its end the establishment of independence. Maritz, one of its leaders, was, on October 26, completely defeated by loyalist troops under the direction of General Smuts, so that the rebellion came to an end in those parts. A more serious situation existed in the Union itself. But here too the loyalists prevailed. On October 27 General Botha took the field against General Beyers, the leader of the rebels, defeated him at Commissie Drift, and scattered his troops. On November 12 Botha routed De Wet at Mushroom Valley. A fugitive, De Wet was taken prisoner on December 1. Beyers, who in the meantime had collected another force, was again beaten December 7 and in escaping was drowned while trying to swim his horse across the Vail River. His death and De Wet's capture ended the rebellion, though small parties kept the field for some time afterward.

Togoland was taken in a campaign that lasted just three weeks, from Aug. 7 to Aug. 28, 1915. Surrounded on three sides by hostile territory, with the sea under British control, it could not hope to offer any resistance. The Allied base was the littoral; minor expeditions entered the country from the north, the east, and the west. The capital of the colony, Lome, fell on the sixth. The campaign thereafter had for its objective the powerful wireless station at Kamina, 125 miles from the coast. This point was entered, after some fighting by the Allies, on the 27th, and the colony surrendered by its Governor. The German forces could not have exceeded 1000, mostly natives.

Kamerun called for a more serious effort on the part of the Allies. Like Togoland, it was surrounded on all sides by hostile territory,

with the sea under Allied control. But its vastly greater area made operations more difficult and it was more strongly defended. Three expeditions from the northwest were defeated by the Germans in August and September, 1915. Attacking from the sea, however, the Allies took Duala (September 27) and from this point widened their holding. Early in October it was clear that the colony would be lost. Two columns pushed their way into the interior along the railways, one of which on October 26 took Edea, repelling six weeks later a counterattack for its recovery. The other column north of Duala captured the entire railway and advanced beyond its head. The French sent down troops from the Tchad, and others reinforced by Belgians from Equatoria. The result of all these efforts was that German resistance was well worn down, and came to an end with the surrender of Mora Hill early in 1916.

The situation in German Southwest Africa was complicated by the South African rebellion. This rebellion crushed, real operations began in January, Luderitz Bay having been occupied as early as Sept. 18, 1914. Swakopmund was occupied January 14. The campaign was directed against the capital Windhoek and carried on by two armies; the northern under Botha was to move from Swakopmund; while the southern under Smuts, divided into three columns, was to move east from Luderitz Bay, north from Warmbad, and west from Bechuanaland. By May 1, the end was near. On the 12th, Botha entered Windhoek and the struggle was practically over; for pushing on to Grootfontein, now the German capital, he there, on July 9, received the surrender of the enemy forces.

The most important colony in Africa, German East Africa, gave the British far more trouble than any of the others. Here the Germans disposed of some 8000 men, though all reports as to forces in the colonies are subject to caution, and the British forces at the beginning were insignificant, say 1200. During August, 1914, some successes fell to the British. For example, they demolished, August 13, the port of Dar-es-Salaam. On September 3, British reinforcements arrived in time to check German operations against the Uganda railway. September was taken up by German attacks without any special result. The British remained on the defensive, waiting for troops from India. These arrived November 1, and lay off the German port of Tanga. An attack made on the 4th resulted in a decided reverse for the British, who were compelled to reembark. The Germans now invaded British East Africa, but were pushed back to Jassin in German territory, where on January 18 they defeated the British, and forced a withdrawal of all the outlying posts in this region. They had, as early as September, 1914, invaded northeast Rhodesia, where they came into contact with Belgian troops. April, 1915, was spent in skirmishing. In July, 1915, the *Königsberg* was destroyed. This vessel, after doing much mischief, had been chased by British cruisers and had taken refuge (November, 1914) in the Rufiji River. Her guns, however, were removed and used in the defenses of Tabora, on the main east and west line of the colony. General Smith-Dorrien, later relieved by General Smuts, was sent out to take command of the troops in British East Africa and the invasion proceeded from that region, as well as from Nyassa on the south.

The British expedition commanded by Gen. Jan Smuts won an important victory at the Kitovo Hills, near the northern boundary of German East Africa. After five days of fighting (March 7-12) the Germans fell back to a position in the forest along the Rufu River. As a result of the operations that followed, the Germans, although reinforced, were compelled to abandon their positions and retire southward along the Tanga railway.

The Allies began in September to tighten the ring around the colony. The Belgians, French, British, and Portuguese were invading it from all sides. All of the seaports were in their hands and Tobora, a strong fortress in the north was captured (September 1-11), by the Belgians. Progress was slow but in December, 1917, its complete occupation was announced.

The Pacific.—Japan, as Great Britain's ally, declared war on Germany Aug. 23, 1914, but confined her offensive to Germany's possessions in the Pacific. On August 27, she began the blockade of Tsingtao, and by the end of September, two Japanese armies and a few English troops had completed landing, one on the north, the other with the English at Rozan Bay. The German defenses consisted of three lines, the first of fortified hills, the second of 10 forts, the third of five. By September 28, the first two lines had been carried, and the siege was begun. October 31 a general attack was opened on the third line which was occupied November 6. The next day the place was surrendered with 201 officers and 3841 non-commissioned officers and men. The Japanese land forces engaged in the siege numbered 22,980 officers and men, with 142 guns. The British forces were far less numerous, 920 European troops and 450 Sikhs. The British casualties were insignificant, 12 killed and 62 wounded; the Japanese relatively very little greater, 236 killed and 1282 wounded. For the capture of other German islands in the Pacific see the section on *Naval Operations* in this article.

IV. NAVAL OPERATIONS

At the outbreak of the war the belligerent navies were constituted as shown in the subjoined tables. For the sake of space and conciseness, certain methods of lettering and abbreviation are used in the tables and throughout the article, viz.:

Abbreviations: *a.c.*, armored cruiser; *a.c.d.*, armored coast-defense vessel; *b.c.*, battle cruiser; *b.s.*, battleship; *c.*, cruiser (not armored); *des.*, destroyer; *Div.*, division (of a fleet or squadron); *g.b.*, gunboat; *Sq.*, squadron; *sub.*, submarine; *t.b.*, torpedo boat.

EXAMPLES AND EXPLANATIONS

First example: *b.s.* IRON DUKE (25d-10g13.5-22k). Explanation: *b.s.* stands for battleship; small capitals indicate that the vessel is of the dreadnought type; 25d means 25,000 tons' displacement; 10g13.5, that the main battery consists of 10 guns of 13.5-inch calibre; 22k, that the maximum speed is 22 knots.

Second example: *des. Ferret* (0.75d-2g4.2g3-27k), *Hind* (same), *Hydra* (same).

Explanation: this means that the destroyer *Ferret* has a displacement of 750 (0.75 × 1000) tons, carries a main battery of two 4-inch and two 3-inch guns, and has a maximum speed of 27 knots; and that the *Hind* and *Hydra* are the same as the *Ferret* in all respects.

FORCES IN THE NORTH SEA AND ADJACENT WATERS

GREAT BRITAIN

FIRST FLEET (Admiral J. R. Jellicoe, commanding)
Flagship, *b.s.* IRON DUKE (25d-10g13.5-22k); tenders, *c.* *Sappho* (3.4d-2g6.6g4.7-20k), *des. Oak* (0.8-2g4.2g3-

32k); repair ships, *Cyclops* (11d-13k), *Assistance* (10d-13k).

1ST BATTLE SQ., 1st Div.: b.s. MARLBOROUGH (25d-10g13.5-22k), ST. VINCENT (19d-10g12-21k), COLOSSUS (20d-10g12-21k), HERCULES (same).

2d Div.: b.s. NEPTUNE (19d-10g12-21k), SUPERS (same), COLLINGWOOD (same), VANGUARD (same).

2D BATTLE SQ., 1st Div.: b.s. KING GEORGE V (24d-10g13.5-21k), AJAX (same), AUDACIOUS (same), ORION (23d-10g13.5-21k).

2d Div.: b.s. CENTURION (24d-10g13.5-21k), CONQUEROR (23d-10g13.5-21k), MONARCH (same), THUNDERER (same).

3D BATTLE SQ., 1st Div.: b.s. King Edward VII (16d-4g12, 4g9.2-19k), Hibernia (same), Africa (same), Britannia (same).

2d Div.: b.s. Commonwealth (16d-4g12, 4g9.2-19k), Dominion (same), Hindustan (same), Zealandia (same).

4TH BATTLE SQ., 1st Div.: b.s. DREADNOUGHT (18d-10g12-21k), TEMERAIRE (19d-10g12-21k), BELLEROPHON (same), Agamemnon (17d-4g12, 10g9.2-19k).

2d Div.: Not organized; ships under construction. Scouts: 1st Sq., c. *Bellona* (3.3d-6g4-26k); 2d Sq., c. *Boadicea* (3.3d-6g4-26k); 3d Sq., c. *Blanche* (3.4-10g4-26); 4th Sq., c. *Blonde* (3.4-10g4-26k).

1ST BATTLE CRUISER SQ.: b.c. LION (26d-8g13.5-28k), PRINCESS ROYAL (same), QUEEN MARY (27d-8g13.5-28k), NEW ZEALAND (19d-8g12-27k).

2D CRUISER SQ.: a.c. Shannon (15d-4g9.2, 10g7.5-23k), Achilles (14d-6g9.2, 4g7.5-23k), Cochrane (same), Natal (same).

3D CRUISER SQ.: a.c. Antrim (11d-4g7.5, 6g6-22k), Argyll (same), Devonshire (same), Roxburgh (same).

4TH CRUISER SQ.: a.c. Suffolk (10d-14g-23k), Berwick (same), Essex (same), Lancaster (same).

1ST LIGHT CRUISER SQ.: c. Southampton (5.4d-8g6-26k), Birmingham (5.4d-9g6-26k), Lowestoft (same), Nottingham (same).

DESTROYER FLOTILLA of 1st FLEET: c. *Amethyst* (3d-12g4-22k), carrying flotilla commander.

1ST SQ.: c. *Fearless* (3.4d-10g4-25k) and 20 destroyers (0.8d-2g4, 2g3-28 to 30k).

2D SQ.: c. *Active* (3.4d-10g4-25k) and 20 destroyers (0.8d-2g4, 2g3-28k).

3D SQ.: c. *Amphion* (3.4d-10g4-25k) and 13 destroyers (1d-3g4-29k).

4TH SQ.: des. *Swift* (2.2d-4g4-35k) and 20 destroyers (0.9d-3g4-32k).

SECOND FLEET

Flagship: b.s. *Lord Nelson* (17d-4g12, 10g9.2-19k).

5TH BATTLE SQ.: b.s. *Prince of Wales* (15d-4g12-18k), Bulwark (same), Formidable (same), Irresistible (same), Implacable (same), London (same), Queen (same), Venerable (same). Scout: c. *Diamond* (3d-12g4-22k).

6TH BATTLE SQ.: b.s. Russell (14d-4g12-19k), Albemarle (same), Cornwallis (same), Duncan (same), Exmouth (same), Vengeance (13d-4g12-18k). Scout: c. *Topaze* (3d-12g4-22k).

5TH CRUISER SQ.: a.c. Carnarvon (11d-4g7.5, 6g6-22k), Sulley (12d-2g9.2, 12g6-21k), c. *Liverpool* (4.8d-2g6, 10g4-25k).

6TH CRUISER SQ.: a.c. Drake (14d-2g9.2, 16g6-23k), King Alfred (same), Good Hope (same).

MINE LAYER SQ.: c. *Andromache* (3.4d-6g2-20k), *Apollo* (same), *Intrepid* (same), *Iphigenia* (same), *Latona* (same), *Navad* (same), *Thetis* (same).

THIRD FLEET

7TH BATTLE SQ.: b.s. Caesar (15d-4g12-18k), Hannibal (same), Illustrious (same), Magnificent (same), Majestic (same), Mars (same), Victorious (same), Prince George (same). Tender: c. *Doris* (5.6d-11g6-20k).

8TH BATTLE SQ.: b.s. Albion (13d-4g12-18k), Canopus (same), Glory (same), Goliath (same), Ocean (same), Jupiter (15d-4g12-18k). Tender: c. *Proserpine* (2d-8g4-20k).

7TH CRUISER SQ.: a.c. Aboukir (12d-2g9.2, 12g6-21k), Hogue (same), Cressy (same), Bacchante (same), Euryalus (same).

8TH CRUISER SQ.: Not organized.

9TH CRUISER SQ.: a.c. Donegal (10d-14g6-23k), Monmouth (same), c. *Europa* (11d-16g6-21k), *Amphitrite* (same), *Argonaut* (same), *Challenger* (5.9d-11g6-21k), *Vindictive* (5.8d-10g6-19k), *Highflyer* (5.6d-11g6-20k).

10TH CRUISER SQ.: c. *Edgar* (7.4d-2g9.2, 10g6-20k), *Grafton* (same), *Hawke* (same), *Theseus* (same), *Crescent* (7.7d-1g9.2, 12g6-20k), *Royal Arthur* (same), *Gibraltar* (7.7d-2g9.2, 10g6-20k).

PATROL FLOTILLA. Consists of 6 scout cruisers as flagboats and the 6th, 7th, 8th, and 9th destroyer flotillas (79 boats—360 to 1060 tons); 7 old cruisers and the 3d, 4th, 5th, 6th, 7th, 8th, and 9th submarine flotillas (3 boats of 210 tons, 86 of 320 tons, 8 of 630 tons, 6 of 825 tons); also 24 torpedo boats of 250 tons.

COAST-DEFENSE FLOTILLAS. These are separately organized for each port and consist of 21 destroyers (320 to 480 tons), 44 torpedo boats (75 to 750 tons), and 7 submarines (210 to 320 tons).

FRANCE

(North Sea and Atlantic Forces)

2D LIGHT SQ.: *Armored Cruiser Div.*: a.c. *Marseillaise* (10d-2g7.6, 8g6.4-21k), *Aube* (same), *Condé* (same).

Destroyer Flotilla: c. *Dunois* (0.9-6g2.5-22k) flagboat; three divisions of 6 boats each (310 to 340 tons, 26 to 27 knots).

Submarine Flotilla: Five divisions with 5 destroyers as flagboats, 18 submarines (550 to 810 tons).

Mining Flotilla: Two mine layers (800d-20k), 1 gunboat (950d-21k), 1 destroyer (300d-26k).

Schoolship Div.: a.c. *Gloire* (10d-2g7.6, 8g6.4-21k), *Jeanne d'Arc* (11d-2g7.6, 14g5.5-23k), *Gueydon* (9d-2g7.6, 8g6.4-21k), *Dupetit Thouars* (same).

COAST DEFENSE. The mobile defense of Cherbourg, Brest, Rochefort, Dunquerque, and Bidasoa consists of 2 destroyers, 7 torpedo boats, and 11 submarines.

RUSSIA

(Baltic Sea only)

ACTIVE FLEET (Admiral von Essen, commanding)

BATTLESHIP SQ.: b.s. *Czarevitch* (13d-4g12-18k), *Imperator Pavel I* (16d-4g12, 14g8-23k), *Andrei Persovany* (same), *Slava* (14d-4g12-18k), a.c. *Rurik* (15d-4g10, 8g8-22k).

ARMORED CRUISER SQ.: a.c. *Gromoboi* (13d-4g8, 22g6-20k), *Bayan* (7.8d-2g8, 8g6-21k), *Pallada* (same), *Admiral Makarov* (same), des. *Novik* (1.3d-4g4-30k).

DESTROYER FLOTILLA, 1st Div.: Base, Libau; 4 divisions of 9 boats each (350 to 580 tons, 26 knots).

2d Sq.: Base, Helsingfors; 2 divisions of 9 boats, 1 of 8 boats (350 tons, 26 knots).

SUBMARINE FLOTILLA, 1st Div.: Base, Libau, 2 boats of 370 tons, 1 of 150, 1 of 120.

2d Div.: Base, Revel; 4 boats of 450 tons.

SHIPS IN RESERVE, battleships *Imp. Alex. II* (9d-2g12, 5g8-15k), *Petr Veliki* (10d-4g8-12k).

Armored cruiser: *Rossya* (12d-4g8, 22g6-19k). Cruisers: *Diana* (6.7d-8g6-20k), *Aurora* (same). Destroyers and submarines: Many building; some completed.

Torpedo boats: About 20 (108 to 150 tons).

GERMANY

HIGH SEAS FLEET (Vice Admiral Ingenohl, *commanding)

Flagship: *FRIEDRICH DER GROSSE* (25d-10g12-23k).

1ST BATTLESHIP SQ., 1st Div.: b.s. OESTFRIESLAND (22d-12g12-21k), HELGOLAND (same), THURINGEN (same), OLDENBURG (same).

2d Div.: b.s. POSEN (19d-12g11-20k), NASSAU (same), RHEINLAND (same), WESTFALEN (same).

2D BATTLESHIP SQ., 1st Div.: b.s. *Preussen* (13d-4g11-18k), *Schleswig-Holstein* (same), *Pommern* (same), *Schlesien* (same).

2d Div.: b.s. *Hannover* (13d-4g11-18k), *Hessen* (same), *Lothringen* (same), *Deutschland* (same).

3D BATTLESHIP SQ., 1st Div.: b.s. KAISER (24d-10g12-23k), KAISERIN (same), FR. REG. LUITPOLD (same), KÖNIG ALBERT (same).

2d Div.: Ships not completed.

CRUISER SQ., *Battle Cruiser Div.*: b.c. *SEYDLITZ* (25d-10g11-29k), *VON DER TANN* (19d-8g11-27k), *MOLTKE* (23d-10g11-27k), *DERFFLINGER* (28d-8g12-30k).

LIGHT CRUISER SQ.: c. *Köln* (4.3d-12g4.1-27k), *Kolberg* (same), *Mainz* (same), *Rostock* (4.8d-12g4.1-27k), *Strassburg* (4.5d-12g4.1-27k), *Stralsund* (same), *Dresden* (3.6d-10g4.1-24k), *Stettin* (3.4d-10g4.1-24k).

DESTROYER FLOTILLAS: 1st Flotilla: 12 boats (550 tons-2g3 4-32.5k).

2d Flotilla: 12 boats (570d-2g3 4-32.5k).

3d and 4th Flotillas: each of 12 boats (640 tons-2g3 4-32.5k).

5th Flotilla: 12 boats (616 tons-2g3 4-30k).

6th and 7th Flotillas: each of 12 boats (550 tons-2g3 4-30k).

SUBMARINE FLOTILLAS; 1st Flotilla: 7 boats, U-21 to U-27 (910 tons).

2d Flotilla: 7 boats, U-14 to U-20 (295 tons).

3d Flotilla: 7 boats, U-7 to U-13 (255 tons).

MINE LAYERS FLOTILLA: *Arkona* (1970 tons), *Nautilus* (same), *Albatross* (2200 tons), *Pelikan* (2360 tons).

RESERVE SQUADRONS

4TH BATTLESHIP SQ.: b.s. *Wittelsbach* (12d-4g9.4-18k), *Zähringen* (same), *Schwaben* (same), *Mecklenburg* (same), *Elsass* (13d-4g11-18k), *Braunschweig* (same).

* Oscar von Ingenohl, born (1857) at Neuwied; spent half of his seafaring life in the Far East in command of various vessels; attached to Admiralty in Berlin (1897-1901); accompanied the Kaiser on many of his cruises and for a time commanded the royal yacht *Hohenzollern*; rear admiral (1908); commander of second squadron of the high-sea fleet (1910); served in command during early part of European War, but was removed (February, 1915).

5TH BATTLESHIP Sq.: *b.s. Kaiser Barbarossa* (11d-4g9.4-18k), *Kais. Wilhelm der Grosse* (same), *Kais. Wilhelm II* (same), *Kais. Karl der Grosse* (same).
ARMORED COAST-DEFENSE SQUADRON: *a.c.d. Siegfried* (4d-3g9.4-15k), *Beowulf* (same), *Frihtof* (same), *Heimdall* (same), *Hildebrand* (same), *Hagen* (same), *Odin* (3.5d-3g9.4-15k), *Aegir* (same).

SQUADRON OF INSTRUCTION, Cadet and Seaman Schools: *c. Freya* (5.6d-2g8.2, 8g5.9-18k), *Hertha* (same), *Vineta* (same), *Victoria Louise* (same), *Hansa* (same), *b.s. (old) König Wilhelm* (10d-22g9.4-15k).

Gunnery School: *b.s. Wettin* (12d-4g9.4-18k), *a.c. Blücher* (16d-12g8.2-23k), *Prinz Adalbert* (9d-4g8.2, 10g5.9-20k), *c. Augsburg* (4.3d-12g4.1-27k), *Danzig* (3.2d-10g4.1-23k), *Stuttgart* (3.4d-10g4.1-24k).

Torpedo School: *b.s. (old) Württemberg* (7d-6g10.2-16k), *a.c. Fürst Bismarck* (11d-4g9.4, 12g5.9-19k), *Friedrich Karl* (9d-4g8.2, 10g5.9-20k), *c. München* (3.2d-10g4.1-23k).

Old battleships: *b.s. Worth* (10d-6g11-17k), *Brandenburg* (same).

Destroyers and submarines: About 35 destroyers, 6 submarines, 50 torpedo boats and several old cruisers and coast-defense craft were in reserve or laid up.

BELLIGERENT NAVAL FORCES IN THE MEDITERRANEAN

GREAT BRITAIN

2D BATTLE CRUISER Sq.: *b.c. Inflexible* (17d-8g12-27k), *Indomitable* (same), *Indefatigable* (19d-8g12-27k).

1ST CRUISER Sq.: *a.c. Defense* (15d-4g9.2, 10g7.5-23k), *Black Prince* (14d-6g9.2, 4g7.5-23k), *Duke of Edinburgh* (same), *Warrior* (14d-6g9.2, 10g6-23k).

Light cruisers: *c. Gloucester* (4.8d-2g6, 10g4-26k), *Chatham* (5.4d-9g6-26k), *Dublin* (same), *Weymouth* (5.3d-8g6-26k).

5TH DESTROYER FLOTILLA: 24 boats (550 tons-27 knots).
Submarines: 6 boats of 320 tons.

FRANCE

FIRST FLEET (Vice Admiral Boué de Lapeyrière, commanding)

SECTION OF THE COMMANDER IN CHIEF: Flagship: *b.s. Courbet* (23d-12g12-21k), *b.s. Jean Bart* (23d-12g12-21k), *c. Jurien de la Gravière* (5.6d-8g6.4-23k).

1ST BATTLESHIP Sq., 1st Div.: *b.s. Diderot* (18d-4g12, 12g9.4-19k), *Danton* (same), *VERGNIAD* (same), *FRANCE* (23d-12g12-21k).

2d Div.: *b.s. Voltaire* (18d-4g12, 12g9.4-19k), *MIRABEAU* (same), *CONDORCET* (same), *PARIS* (23d-12g12-21k).

2D BATTLESHIP Sq., 1st Div.: *b.s. Verité* (15d-4g12-19k), *Republique* (same), *Patris* (same).

2d Div.: *b.s. Justice* (14d-4g12-19k), *Democratie* (same).
LIGHT Sq., 1st Div.: *a.c. Jules Michelet* (12d-4g7.6, 12g6.4-22k), *Ernest Renan* (13d-4g7.6, 12g6.4-24k), *Edgar Quinet* (14d-14g7.6-23k), *Waldeck Rousseau* (same).

2d Div.: *a.c. Léon Gambetta* (12d-4g7.6, 12g6.4-23k), *Victor Hugo* (same), *Jules Ferry* (same).

Supplementary Battleship Div.: *b.s. Suffren* (12d-4g12-18k), *St. Louis* (11d-4g12-18k), *Bouvet* (12d-2g12, 2g10.8-18k).

DESTROYER FLOTILLA: flagboat, *des. Bouchier* (0.70d-2g3.9, 2g2.6-32k).

1st Div.: 5 boats (0.73d-2g3.9, 2g2.5-32k).

2d Div.: 5 boats (0.4 to 0.45d-6g2.6-28k).

3d Div.: 5 boats (0.45d-6g2.6-28 to 31k).

4th Div.: 6 boats (0.33 to 0.4d-1g2.6-27 to 30k).

5th Div.: 6 boats (0.33d-1g2.6-29k).

6th Div.: 5 boats (0.75d-2g3.9, 4g2.6-30 to 32k).

SUBMARINE FLOTILLA: flagboat, *des. Dehorter* (0.75d-2g3.9, 4g2.6-31k).

1st Div.: *des. Arbalète* (0.3d-1g2.6-31k), 3 submarines (550 tons).

2d Div.: *des. Hallebarde* (0.3d-1g2.6-27k), 2 submarines (550 tons).

3d Div.: *des. Dard* (0.3d-1g2.6-29k), 2 submarines (550 and 490 tons).

4th Div.: *des. Mousqueton* (0.3d-1g2.6-29k), 3 submarines (550 tons).

5th Div.: *des. Sarbacane* (0.3d-1g2.6-29k), 2 submarines (550 tons).

Mine layers: *Caubianca* (945 tons), *des. Baliste* (300 tons).

Schoolship Div.: *b.s. Jaureguiberry* (12d-2g12, 2g10.8-18k), *Charlemagne* (11d-4g12-18k), *Gaulois* (same), *Marceau* (11d-4g13.4-16k), *a.c. Potruau* (6.3d-2g7.6, 10g5.5-19k), *g.b. La Hire* (0.9d-6g2.6-22k), transport *Tourville*.

DEFENSE MOBILE. At Toulon, 3 submarines, several torpedo boats, 1 mother ship for aeroplanes; at Biserta, 3 submarines and several torpedo boats.

Morocco Div.: *c. Du Chayla* (4d-6g6.4, 4g3.9-20k), *Cassard* (same).

Levant Div.: *a.c. Latouche Tréville* (4.7d-2g7.6, 6g5.5-18k), *Brutiz* (same).

Miscellaneous: In addition to the active forces mentioned, there were 5 old battleships (1891-97), 4 old armored cruisers, and 10 old cruisers which were on special

service, in reserve, or laid up; also about 12 destroyers, 17 submarines, and 115 torpedo boats.

RUSSIA

MEDITERRANEAN Sq.: *a.c. Bogatyr* (6.7d-12g6-23k), *Oleg* (same).

GERMANY

SPECIAL Sq.: *b.c. Goeben* (23d-10g11-27k), *c. Breslau* (4.5d-12g4.1-27k).

AUSTRIA-HUNGARY

BATTLE FLEET (Admiral Haus, commanding)

1st Div.: *b.s. VIRIBUS UNITIS* (20d-12g12-21k), *Tegetthoff* (same), *Prinz Eugen* (same).

2d Div.: *b.s. Erzherzog Franz Ferdinand* (14d-4g12, 8g9.4-20k), *Radeletsky* (same), *Zrinyi* (same).

3d Div.: *b.s. Erz. Ferd. Max* (10.5d-4g9.4-20k), *Erz. Friedrich* (same), *Erz. Karl* (same).

Cruiser Div.: *a.c. Sankt Georg* (7.2d-2g9.4, 5g7.6, 4g5.9-22k), *Kaiser Karl VI* (6.2d-2g9.4, 8g5.9-21k), *des. Turul* (0.4d-1g2.8, 7g1.8-28k), *Veletut* (same).

Scout Div.: *c. Saida* (3.4d-7g3.9-27k), *Novara* (same), *Ad. Spavin* (same), *Helgoland* (same).

COAST-DEFENSE SERVICE, 1st Div.: *b.s. Hapsburg* (8d-3g9.4-19k), *Arpad* (same), *Ebenburg* (same).

2d Div.: *b.s. Wien* (5.5d-4g9.4-17k), *Monarch* (same), *Buda-Pest* (same).

Cruisers: *a.c.d. Kronprinz Erzherzog Rudolf* (6.8d-3g12-16k), *a.c. Kaiserin Maria Theresia* (5.2d-2g7.6, 8g5.9-19k), *c. Kaiser Franz Joseph I* (4d-8g5.9-19k), *Aspern* (2.4d-8g4.7-20k), *Tugetear* (same), *Zenta* (same), *Panther* (1.5d-2g4.7-18k).

Destroyer Flotilla: 6 boats (0.8d-2g4-32.5k), 10 boats (0.4d-1g2.8-28k); reserve 1 boat (0.5d-6g1.8-26k), 6 boats (0.4 to 0.5d-misc.-20 to 23k).

Torpedo-Boat Flotilla: 12 boats (0.25d-2g2.8-28k), 24 boats (0.2d-4g1.8-26k), 12 boats (0.1d-2g1.8-28k), 6 boats (0.1d-2g1.8-26k), 11 boats (0.1d-2g1.4-19k), mother ship (13d-4g4.7-20k).

Submarine Flotilla: 2 boats (270 tons), 2 boats (300 tons), 2 boats (273 tons), 1 depot ship (1d-4g2.8-15k).

ITALY

NOTE.—Though Italy did not enter the war until later, for purposes of comparison the condition on Aug. 1, 1914, is given.

ACTIVE FLEET (Vice Admiral Marcelllo, commanding)

FIRST Sq., 1st Div.: *b.s. DANTE ALIGHIERI* (19d-12g12-23k), *GIULIO CESARE* (22d-13g12-28k), *LEONARDO DA VINCI* (same), *c. Nino Bixio* (3.5d-6g4.7-29k).

1st Destroyer Flotilla: 4 boats (0.7d-1g4.7, 4g3-30k).

3d Div.: *b.s. Regina Margherita* (13d-4g12, 4g8-20k), *Benedetto Brin* (same), *Emanuele Filiberto* (10d-4g10-18k), *Ammiraglio di St. Bon* (same).

4th Destroyer Flotilla: 6 boats (0.4d-4g3-29k).

5th Div.: *a.c. Giuseppe Garibaldi* (7.2d-1g10, 2g8, 14g6-20k), *Varese* (same), *Francesco Ferruccio* (same), *Carlo Alberto* (6.4d-12g6-19k), *g.b. Coati* (13d-12g3-23k).

5th Destroyer Flotilla: 6 boats (0.33d-1g3.5, 2g2-30k).

SECOND Sq., 2d Div.: *b.s. Regina Elena* (12.5d-2g12, 12g8-22k), *Vittorio Emanuele III* (same), *Roma* (same), *Napoli* (same), *c. Quarto* (3.2d-6g4.7-28k).

3d Destroyer Flotilla: 6 boats (0.7d-1g4.7, 4g3-30k).

4th Div.: *a.c. Pisa* (10d-4g10, 8g7.5-23k), *Amalfi* (same), *San Giorgio* (9.7d-4g10, 8g7.5-23k), *San Marco* (same), *c. Marsala* (3.5d-6g4.7-29k), *g.b. Agordat* (1.3d-12g3-23k).

2d Destroyer Flotilla: 6 boats (0.4d-4g3-29k).

IN RESERVE OR ON SPECIAL SERVICE IN THE MEDITERRANEAN: Battleships: *b.s. CONTE DI CAVOUR* (22d-13g12-23k); old battleships, *b.s. Dandolo* (12d-4g10-16k), *Duilio* (same), *Sardegna* (13d-4g13.5-20k), *Sicilia* (same), *Re Umberto* (same).

Armored cruiser: *a.c. Vettor Pisani* (6.4d-12g6-19k).

Cruisers: *c. Libia* (3.7d-2g6, 8g4.7-22k) and 6 old cruisers (2200 to 3500 tons).

Destroyers: About 14 (300 to 700 tons).

Torpedo boats: About 93 (34 to 215 tons).

Submarines: 20 boats (110 to 463 tons).

SHIPS IN FOREIGN WATERS:
China Seas: *a.c. Marco Polo* (4.5d-6g6, 10g4.7-19k).
Red Sea and Indian Ocean: *c. Piemonte* (2.6d-10g4.7-22k), *Calabria* (2.5d-6g4.7-16k).

TURKEY

NOTE.—Though Turkey did not enter the war until later, for purposes of comparison the condition on Aug. 1, 1914, is given, adding the GOEBEN and BRESLAU. The battleships building in England were taken over by Great Britain at the outbreak of war. So far as known the Turkish navy had no fleet or squadron organization. The vessels were as follows:

Battle cruiser: *SULTAN SELIM JAVUZ* (ex-Goeben) (23d-10g11-27k).

Battleships (old): *Kheyr-ed-din Barbarossa* (10d-6g11-17k), *Torgut Reis* (same).
 Old b.s. reconstructed as a.c.: *Messudieh* (10d-2g9.2, 12g6-16k).
 Coast-Defense vessel: *Muin-i-Zaffer* (2.7d-4g6-12k).
 Cruisers: *Medilla* (ex-Breslau) (4.5d-12g4.1-27k), *Hami-dieh* (3.8d-2g6, 8g4.7-22k), *Medjidieh* (3.4d-2g6, 8g4.7-22k).
 Destroyers: 4 boats (0.6d-2g3.4-35k), 6 boats (0.3d-various-25 to 28k).
 Torpedo boats: 10 boats (96 to 165 tons-27k).
 Submarines: none. Many small gunboats.

BELLIGERENT NAVAL FORCES IN THE BLACK SEA

RUSSIA

ACTIVE FLEET (Admiral Eberhard, commanding)

BATTLESHIP Sq.: b.s. *Panteleimon* (13d-4g12-16k), *Tri Sviatiteliya* (13d-4g12-17k), *Joann Zlatoust* (13d-4g12, 4g8-16k), *Sviatos Evtasti* (same), Repair ship *Kronstadt* (16d-13k).
 Destroyer Flotilla: 1st Div.: 6 boats (615 tons, 25 knots); 2d Div.: 6 boats (360 tons, 26 knots); 3d Div.: 6 boats (250 tons, 26 knots).
 Submarine Div.: 2 boats (240 tons), 2 boats (150 tons).
 Mine layers: *Beresany* (5d-12k), *Prut* (same).
 Submersible mine layer: *Krab* (500 to 700 tons).
 RESERVE SHIPS: b.s. *Georgi Pobedonosets* (11d-6g-12-16k), *Sinop* (same), *Rostislav* (9d-4g10-16k), a.c. *Kagul* (6.7d-12g6-23k), *Pamyat Mercuria* (same). Torpedo boats, 10 (88 to 164 tons).

BELLIGERENT NAVAL FORCES IN THE PACIFIC AND INDIAN OCEANS

GREAT BRITAIN

Battleships: *Triumph* (12d-4g10, 14g7.5-20k), *Swiftsure* (same).
 Armored cruisers: *Minotaur* (15d-4g9.2, 10g7.5-23k), *Hampshire* (11d-4g7.5, 6g6-23k).
 Cruisers: *Newcastle* (4.8d-2g6, 10g4-26k), *Glasgow* (same), *Yarmouth* (5.3d-8g6-26k), *Dartmouth* (same), *Fox* (4.4d-2g6, 8g4.7-19k), *Philomel* (2.6d-8g4.7-16k), *Psyche* (2.1d-8g4-20k), *Pyramus* (same), *Pelorus* (same).
 Submarines: 3 of 320 tons.
 Australian navy: b.c. *Australia* (19d-8g12-27k), c. *Melbourne* (5.4d-8g6-26k), *Sydney* (same), *Encounter* (5.9d-11g6-21k), *Pioneer* (2.2d-8g4-20k). Destroyers: 3 boats (0.7d-1g4, 3g3-26k). Submarines: 2 of 825 tons.

FRANCE

Armored cruisers: *Montcalm* (9.5d-2g7.6, 8g6.4-21k), *Dupleix* (7.6d-8g6.4-21k).
 Destroyers: 3 boats (0.3d-1g2.6-30k).

RUSSIA

Cruisers: *Askold* (6d-12g6-23k), *Jemtschug* (3.1d-6g4.7-24k).
 Destroyers: 1st Div.: 8 boats (0.35d-26k); 2d Div.: 7 boats (0.24d-26k).
 Submarines: 1 div. of 5 boats (175 to 200 tons).
 Reserve: 4 torpedo boats, 3 submarines, 2 mine layers.

GERMANY

Armored cruisers: *Scharnhorst* (11.4d-8g8.2, 6g5.9-23k), *Gneisenau* (same).
 Cruisers: *Emden* (3.6d-10g4.1-24k), *Dresden* (same), *Nürnberg* (3.4d-10g4.1-24k), *Königsberg* (same), *Bremen* (3.2d-10g4.1-23k), *Leipzig* (same).
 Miscellaneous: Many unimportant gunboats, 500 to 1600 tons, of no fighting value.

BELLIGERENT NAVAL FORCES IN THE NORTH ATLANTIC

GREAT BRITAIN

Temporary Squadron: a.c. *Monmouth* (10d-14g6-23k), and several old and unimportant cruisers.
 Canadian navy: c. *Niobe* (11d-16g6-20k), 1 mine layer, 1 transport.

GERMANY

Cruiser: *Karlsruhe* (4.8d-12g4.1-27k).
 Miscellaneous: Several fast passenger steamers which were turned into auxiliary cruisers.

FRANCE

Temporary squadron of two cruisers in Mexico.

Operations in the North Sea and the Waters about Great Britain. At the end of July, 1914, the German High Seas fleet was off the coast of Norway and nearly the whole of the British Grand fleet lay at Spithead off the Isle of Wight. As the probability of war increased, more and more definite steps were taken to prepare for mobilizing the entire British naval force and putting into full commission all ships in reserve and laid up. On August 2, German troops invaded Belgium and the same day the British Grand fleet was ordered to proceed to an unknown destination in the North Sea. On August 4, Great Britain and France declared war and mobilization of both fleets was directed. Within four hours of the declaration of war, British scouting squadrons were sent towards the German fleet and coast, one submarine flotilla exploring the Helgoland light.

The German High Seas fleet, being vastly inferior to the British forces facing it, was hastily withdrawn behind the defenses of the German coast at Kiel and in the Kaiser Wilhelm Canal which had fortunately been completed a couple of months before.

The laying of mines now proceeded with indescribable rapidity. It is supposed that the Germans had begun as early as July 29, but this is uncertain. Not only were the German harbors and the vicinity of Helgoland protected but the whole eastern part of the North Sea was planted with mine fields where they were most likely to be useful and the approaches to the Baltic were closed except a narrow strip along the Swedish coast in Swedish territorial waters and the channels through the mined area which were known only to German and Danish pilots. Denmark was forced to lay mines in her own waters by Germany which sent her an ultimatum stating that if she did not place them Germany would. According to British reports the German fields were extended over the whole southern part of the North Sea above a line joining the Hook of Holland with Harwich, England. The separate mine areas were small or narrow but were so numerous as to make navigation dangerous. The British thereupon closed the Strait of Dover by a mined area with boundaries consisting of the parallels of 51° 15' and 51° 40' N. latitude and the meridians of 1° 35' and 3° E. longitude.

They then began a systematic search for German mines, mine layers, and protecting forces, and also dispatched their mine-sweeping groups of trawlers as fast as work was found for them. It was in connection with mine planting that the first naval action of the war was brought about. On August 5, H.M.S. *Amphion* (3400t-25k), with the third destroyer flotilla, was carrying out a prearranged plan of search when a suspicious ship was reported by a trawler. This was the German mine layer *Königin Luise*, and she was chased and sunk; but early the next morning the *Amphion* struck a mine and was herself destroyed.

On August 9, the First Light Cruiser Squadron was attacked by three or more German submarines, showing only their periscopes. A lucky shot destroyed the periscope of one boat and the splash of countless projectiles blinded the view from the periscopes of the others. All except the injured boat disappeared and retreated but she came to the surface after a time quite close to the cruisers. Just as her

conning tower appeared sufficiently to note her name, *U-15*, a shot from the *Birmingham* tore a hole in its base and the boat sank like a stone. None of the British vessels was injured. For more than two weeks following this incident the British continued their scouting and dragging for mines. Frequent clashes took place between the patrol vessels but no serious damages were inflicted on either side.

On August 26, the Eighth Submarine Flotilla (eight boats), two destroyer flotillas, and their flag cruisers and tenders, were ordered to proceed to reconnoitre Helgoland and the waters to the southward. They were followed by the Battle Cruiser and First Light Cruiser Squadrons at a distance of 20 to 30 miles. On August 28, the destroyer flotillas, when about 25 miles from Helgoland, and not much farther from Wilhelmshaven, found the enemy in superior force and were compelled to fall back. Admiral Beatty* promptly sent the First Light Cruiser Squadron to their assistance but, as the enemy's force seemed strong, he soon decided to follow with his heavy vessels. The advent of the battle cruisers quickly decided matters. In a short time, the German vessels were retiring along the whole front. The light cruisers, *Mainz*, *Köln*, and *Ariadne*, and the destroyer *V-187* were sunk. No British vessels were lost but the *Arethusa*, flagship of the destroyer fleet, was severely injured and had to be towed to England. As soon as his light vessels were safely withdrawn, Admiral Beatty retired the battle cruisers as he was operating in the vicinity of mine fields and was exposed to attack by submarines, several of which were seen. The *Queen Mary* was twice attacked and the *Lowestoft* once, but high speed in each case made the attempt abortive. The short range of the torpedoes used in German submarines was first noticed in these attacks.

The month of September was a particularly eventful one. On September 3, the British gunboat *Speedy* was destroyed by a mine and, on September 7, the light cruiser *Pathfinder* was sunk by the German *U-21*, the first surface vessel to fall a victim to the dreaded submarine. On September 9, the White Star liner *Oceanic*, now a naval transport, was run ashore in a fog and wrecked. On September 28, there came an event which startled the world and added greatly to the prestige of the submarine. About daylight that morning, the British armored cruisers *Aboukir*, *Hogue*, and *Cressy* were on patrol duty in the North Sea and steaming at moderate speed in column. At 6.25 A.M., the *Aboukir*, which was leading, was struck by a torpedo from a submarine and began to sink slowly. The *Hogue* and *Cressy* came up to her assistance, stopped, and attempted to save life. A little before 7 A.M., a torpedo struck the *Hogue*. She quickly capsized and sank; probably the torpedo exploded a magazine. About 7.15, the *Cressy* was hit by a torpedo and 15 minutes later by another. The reports indicate that, of the personnel of the three ships, 1067 were saved and about 1133 drowned. All were sunk by the German submarine *U-9*, a 300-ton

boat commanded by Kapitän-Leutnant Weddigen. The ease with which he performed his work was due to the lack of a destroyer screen and the folly of the *Hogue* and *Cressy* in stopping their engines in the known presence of submarines. The frightful loss due to this error caused the Admiralty to issue orders forbidding large vessels to proceed to the assistance of others under such circumstances.

After the *Aboukir-Hogue-Cressy* catastrophe the war against submarines was intensified. New types of mines were devised. Air craft began to scout for them and finally to destroy them by dropping bombs on their decks or in their hatches. Huge wire nets were built. Some were supported by floating buoys, others by buoys which were kept below the surface by the moorings. While it was expected that some submarines would become inextricably entangled in the nets, this was not relied upon. The nets were watched and when an entangled submarine came to the surface she was destroyed by gun fire. It was soon found that this watching could well be performed by very fast motor boats carrying 1, 3, or 6 pounders or a short 3-inch. Hundreds of these were built—many purchased in the United States. The speed was high—well over 20 knots in all cases and as near 30 knots as the size and condition permitted. By means of these and of nets stretching almost from shore to shore and in several places, the channel was kept nearly free from the enemy's submarines during the transport of troops and munitions of war to France.

During the month of October, the Germans lost a destroyer and a submarine; the British, a submarine, an old cruiser, and the dreadnought battleship *Audacious* by a mine. On November 3, a German scouting expedition along the Yorkshire coast destroyed a British submarine and slightly injured a gunboat. The armored cruiser *Yorck*, returning from this service, struck a chain of mines in entering the Jahde estuary and was sunk. A week later the gunboat *Niger* was sent to the bottom by a German submarine in the Downs north of Dover. On the 16th, the German auxiliary cruiser *Berlin* was interned at Trondjem; on the 20th, *U-18* was rammed by a patrol boat and foundered; on the 23d, the German destroyer *S-124* was sunk in collision with a Danish steamer; and on the 26th, the old British battleship *Bulwark* was blown up in Sheerness harbor. The loss of the *Bulwark* was due to some form of interior explosion in which her magazines were involved. The explosion was tremendously violent, only 14 of the complement of 815 escaping; and the ship sank in three minutes.

During the month of November, naval vessels were used to support the army by attacking the enemy's right flank wherever it reached the coast. Three small river monitors, purchased from Brazil, were found to be of great service in this work, their light draft of four and one-half feet enabling them to get close in shore.

On December 16, a German battle cruiser squadron, supposedly consisting of the *Derfflinger*, *Seydlitz*, *Moltke*, *Von der Tann*, and *Blücher*, raided the Yorkshire coast, bombarding the harbors and cities of Hartlepool, Whitby, and Scarborough (qq.v.). Nearly 100 noncombatants were killed and 500 wounded. None of the towns has forts or defensive works of any kind.

On Christmas day, a squadron of seven naval

* Sir David Beatty, born (1871) in County Wexford, Ireland; entered navy (1884); served with Nile flotilla (1896) and in the advance on Peking (1900); aid-de-camp to King Edward VII (1908); naval secretary to First Lord of the Admiralty (1912); commander First Battle Cruiser Squadron (1912); K.C.B. (1914); vice admiral (1915), youngest officer ever to reach that grade; married a daughter of Marshall Field of Chicago.

seaplanes delivered an attack on Cuxhaven naval base but did no damage of importance; four of the aeroplanes were lost, though all the operators were saved. Bombs were dropped on or near the German warships lying in Schillig roads but none were materially injured. The only value of the raid seems to have been a gain in experience and some information of the enemy's condition.

The year 1915 opened with the sinking of the old battleship *Formidable* on January 1, by a German submarine in the Channel off Plymouth. This feat is specially remarkable as it took place at night and in a heavy sea, both conditions being very unfavorable to submarine operations. She was not, however, accompanied by destroyers and this enabled the submarine to approach on the surface without being seen.

On the morning of January 24, the fast cruiser fleet, in command of Vice Admiral Sir David Beatty, was patrolling in the North Sea (approx. Lat. 55° N., approx. Long. 5° E.). This fleet consisted of the First Battle Cruiser Squadron, *Lion*, *Tiger*, *Princess Royal*, *New Zealand*, and *Indomitable*; the First Light Cruiser Squadron, *Southampton*, *Nottingham*, *Birmingham*, and *Lowestoft*; and two destroyer flotillas. About 7 A.M., the cruiser *Aurora*, one of the destroyer flagships, sighted the German light cruiser *Kolberg* and a destroyer flotilla and, at 7.25, action began between them. About this time the German fast squadron (Rear Admiral Hipper), steering northwest, was sighted from the destroyer flotillas. This consisted of the battle cruisers *Derfflinger*, *Seydlitz*, and *Moltke* and the large armored cruiser *Blücher*. As soon as the information was signaled to Admiral Beatty, he headed for the enemy which had changed course to southeast as soon as they perceived the British battle cruisers. At 8.52, the *Lion* (flagship) opened fire on the *Blücher*, the rear ship of the German column, at a range of a little less than 20,000 yards but did not effect a hit until 9.09. The German vessels began to return the fire at 9.14; the *Tiger* began at 9.20, the *Princess Royal* a few minutes later, and the *New Zealand* at 9.40. The *Indomitable*, the slowest of the British ships, apparently did not get near enough to any of the German ships to open fire until after the *Blücher* was disabled. The last named had much less speed than the other German vessels and slowly dropped astern. About 10.48, she fell out of line and turned to the northward with a heavy list. The *Indomitable* was ordered to attack her and the others of the British fleet pushed forward after the main body. At 10.54, submarines were reported on the starboard bow of the *Lion*. The British fleet at once changed course towards the left. At 11.03, the *Lion* received a shell in her engine room which disabled her port engine and she hauled out of action, but Admiral Beatty was unable to transfer his flag to the *Princess Royal* until 12.20. The British squadron was now retiring, having pursued the enemy as close as possible to the areas protected by mine fields and submarines. The German losses are not exactly known. Of the *Blücher's* total complement of 885, about 200 were saved by British destroyers; and they were bombarded by German aeroplanes and a Zeppelin while engaged in this work. The German reports of the injuries to their three battle cruisers are not in agreement. One says that but a single battle cruiser was injured while another

congratulated the navy that none of the injuries received would require the ships to be docked. The British casualties were reported in full. The *Lion's* machinery was disabled by destruction of the feed tank; after trying to steam with one engine, that began to give trouble through priming so she was taken in tow by the *Indomitable*. On the *Lion*, 17 men were wounded; on the *Tiger*, one officer and nine men were killed and three officers and eight men wounded.

About January 26, the French torpedo boat No. 219 was sunk off Nieuport. On March 4, U-8 was rammed and sunk off Dover, the crew being made prisoners. On March 10, the auxiliary cruiser *Bayamo* was torpedoed by a German submarine and all hands lost. On the same day, U-12 was rammed and sent to the bottom by the destroyer *Ariel* and about the same date U-29 was sunk. The captain of this boat was Commander Weddigen who torpedoed the *Aboukir*, *Cressy*, and *Hogue*. On May 1, the British destroyer *Recruit* was sunk by a submarine and about May 7 the *Maori*, a much larger boat, was destroyed by a mine off Zeebrugge. On May 27, the British auxiliary cruiser *Princess Irene* was blown up in Sheerness harbor, only one of her crew escaping. Like the *Bulwark*, she was loading ammunition and it is supposed that a shell may have dropped from the upper deck to the hold and struck point down among many other projectiles.

On June 10, the British torpedo boats Nos. 10 and 12 were sunk by a German submarine and about the same time U-14 was destroyed and her crew made prisoners. On June 24, the armored cruiser *Rosburgh* was torpedoed but the damage was not so serious as to prevent reaching port; on July 1, the destroyer *Lightning* received injuries of similar gravity from a mine or torpedo, and, although the boat escaped to port, 15 of her crew were lost.

Early in July U-30 was accidentally sunk, but was raised within 48 hours and only one of the crew was found dead. On August 8, the patrol boat *Ramsey* was sunk by the German auxiliary cruiser *Meteor*, but before the latter could escape she was discovered by some British cruisers and was blown up by her commander to avoid surrender. On August 9, the destroyer *Lynx* struck a mine in the North Sea and immediately foundered; and, on August 12, the auxiliary cruiser *India* was sunk by a submarine while on patrol duty. During the early part of August the coast of Belgium was repeatedly bombarded by British vessels to assist military operations. It was reported that at Zeebrugge, which the Germans made a naval port, a number of vessels, including submarines and destroyers, were destroyed by the bombardment.

On August 19, British submarine E-19 grounded on the Danish island of Saltholm in the Sound. Two German destroyers, which sighted her in this position, violated Danish sovereignty by firing upon her in Danish waters. On August 23, a German destroyer was sunk by English boats near Zeebrugge and about the same time U-27 was lost—cause unknown.

Between October 1st and 4th, the Belgian coast was again bombarded to assist military operations. On October 28, the armored cruiser *Argyle* ran ashore and was wrecked. On November 4, German submarine U-8 was disabled off the Dutch coast and was towed into port where she was interned. This is apparently a

new boat with an old number as the *U-8*, reported sunk on March 4, was visibly destroyed and her crew made prisoners. On the same date (November 4), a German submarine of new type (length, 250 feet) was captured by being caught in a British wire net. On November 13, the yachts *Aries* and *Irene* were sunk while on patrol duty (circumstances not reported), and on November 17, the hospital ship *Anglia* was sunk by a mine in midchannel with a loss of 100 lives—chiefly of wounded men. On November 28, a German submarine was sunk off the Belgian coast by a bomb from a seaplane. On December 30, the armored cruiser *Natal* was destroyed by an internal explosion while at anchor. Of the complement of 725, 400 were saved. On Jan. 9, 1916, the *King Edward VII* was sunk by a mine. This battleship belonged to a class that was one of the last and best of the pre-dreadnoughts.

On May 31, 1916, began the greatest naval battle of the war up to that time. About four o'clock in the afternoon the British fast battle squadron of seven battle cruisers and four battleships met the German High Seas fleet of five battle cruisers and 24 battleships off the north-west coast of Denmark. The British engaged the enemy but fell back before the vastly superior force in the direction of their main fleet. In this part of the action they lost the battle cruisers *Queen Mary*, *Invincible*, and *Indefatigable*, and three armored cruisers—all of which were sunk; eight destroyers were sunk during the night attacks. The British Grand fleet came up about six o'clock, and soon afterward the Germans began to retire, pursued by the British. The action continued until after midnight, the night attacks being chiefly those of destroyers and submarines. The German losses are not definitely known but include the following, which are admitted by the German Admiralty: battleship *Pommern*, battle cruiser *Lutzon*, four fast cruisers, and five destroyers. The losses of officers and men were about: British, 5000; Germans, 3500; among the British were Rear Admirals Hood and Arbuthnot. The Germans were favored by misty weather, the close proximity of their own coast (which injured vessels could quickly reach), and by the fact that, a few minutes after the arrival of the main British force, mist and darkness obscured them from the enemy. Both the British and Germans claim that additional vessels of their opponents were destroyed. As regards the British losses, the ships alleged to have been sunk have been seen by disinterested observers; as to further German losses there is no proof.

On June 5, 1916, the British cruiser *Hampshire* was destroyed either by a mine or torpedo near the Orkney Islands. Lord Kitchener of Khartum and his staff lost their lives. The Secretary of State for War was on a mission to Russia.

The *Nottingham* and *Falmouth*, light cruisers, were sunk in the North Sea by German submarines on Aug. 19. On Oct. 26 German torpedo-boat destroyers made an unsuccessful attack on the cross-channel service. They lost two destroyers. The British lost the destroyers, *Flirt* and *Nubian*. On Nov. 23 torpedo boats raided the east coast of England near Ramsgate. They fired only a few shots and then retired. On Jan. 23, 1917, a battle between destroyers occurred in the North Sea. Berlin claimed two British vessels were sunk while all of hers returned. London admitted the loss of one vessel.

On Feb. 26, 1917, German destroyers bombarded Broadstairs and Margate on the English coast. They caused little damage and got away unscathed themselves. In a running fight off the Belgian coast on April 8 the Germans lost one destroyer and another was seriously damaged. Two German destroyers and two small British vessels were sunk near Dover on April 21. During April several raiding expeditions were carried out by the British and Germans. The former bombarded the submarine bases at Ostend and Zeebrugge, and the latter bombarded Ramsgate, Calais, and Dunkirk. During this month also American destroyers under Admiral Sims were sent to European waters and greatly aided in combating the submarines. In the early part of June the British sank the *S-20* and damaged another German destroyer. A few days later each country lost a destroyer by the explosion of mines in the North Sea. British vessels on several occasions crept close to the Dutch coast and captured or destroyed German merchantmen.

On September 5, Scarborough, on the English coast, was shelled by a German submarine. On Oct. 2, 1917, the British cruiser, *Drake*, was torpedoed and sunk off the northern coast of Ireland. On October 17, two German raiding cruisers attacked a convoy in the North Sea and sank 5 Norwegian vessels, 1 Danish, 3 Swedish, and the British destroyers *Mary Rose* and *Strongbow*. On the same day the American transport, *Antilles*, was sunk, with a loss of 70 lives. On November 1, another American transport, the *Finland*, was torpedoed, but she was able to return to the French port she had just left. On November 3 the British sank the German auxiliary cruiser *Marie of Flensburg* and 10 patrol boats in the Cattegat. On the same day they destroyed a crewless raider off the Belgian coast. This is a vessel loaded with high explosives, which will go off on contact. It was electrically controlled, run by gas engines, and is supposed to be steered into hostile warships.

On November 5, the *Alcedo*, an American patrol boat in European waters, was torpedoed and sunk with the loss of 21 men. On November 18, a skirmish occurred between British and German light forces, in which neither side did much damage. The British pursued the Germans to within 30 miles of the Bight of Helgoland. On November 19 the American destroyer, *Chauncey*, was sunk as a result of a collision in the war zone. Twenty-one lives were lost. On December 6, the American destroyer, *Jacob Jones*, was torpedoed and sunk with a loss of over 60 men. On December 17, German cruisers again raided a convoy in the North Sea and sank 11 ships, including the British destroyer, *Partridge*. This caused considerable comment in England and was the subject of an investigation.

The Submarine Campaign.—On Jan. 31, 1917, the German government announced to the world that with certain definite limitations a ruthless submarine warfare was to be carried on against all ships. For details see section, NEUTRAL NATIONS, *United States*. A brief description of the campaign will be given here, as well as a discussion of the methods used to combat it. Up to the time of the beginning of the intensive warfare the amount of tonnage sunk varied according to the British and German reports. The latter claimed that 4,400,000 tons, of which 3,000,000 were British, had been sunk by Feb. 1, 1917. The British Admiralty estimate was slightly more than 3,000,000 tons, both British and other coun-

tries. In the first month of the new warfare Berlin claimed to have sunk 368 vessels of 781,500 tons. These figures varied widely from those given out at London, which claimed that only 490,000 tons had been sunk. In her warfare, Germany made no distinction between neutral and enemy ships. Hospital ships and Belgian relief ships were sunk without warning. Three American vessels were also sunk.

Starting with March, 1917, the Admiralties of the Allied Countries began to report the submarine sinkings in a general way, so that it was impossible to gain facts as to tonnage destroyed and vessels sunk. The Admiralty of each country announced the number of vessels over 1600 tons and those under 1600 tons sunk each week, as well as the number of arrivals and sailings. French estimates place the loss of tonnage in the first four months of 1917 at 2,500,000, which was more than the entire tonnage built in 1916. The weekly and monthly losses fluctuated considerably. April, June, and December, 1917, were high months, while July, August, and September were low months. A conservative estimate of the total tonnage lost during 1917 would be approximately 6,500,000. No figures were published concerning the loss of submarines.

The methods of fighting the submarines were many and varied. Small patrol boats 80 to 110 feet long, very fast, and mounted with small guns, patrolled the coasts of the Allied countries with great regularity. They were a hard mark to hit and their guns were heavy enough to destroy the frail submarine. All merchantmen were armed with guns as heavy as they could reasonably carry and were supplied with trained naval crews. Most of them were also supplied with wireless outfits in order to call for help if necessary. Aeroplanes were given definite routes to patrol and they did effective work, inasmuch as they were able to see a submarine quite a distance down in the water, even if its periscope were not showing above the water. They would then drop a bomb on it or would signal to a destroyer, which would come and drop a depth bomb, which was timed to explode at a given depth. All the Allied destroyers were supplied with depth bomb throwing devices. Another scheme used was the smoke screen. By means of chemical action a dense cloud of heavy smoke could be thrown around a vessel, which would hide it to such an extent that the U-boat would be unable to aim its torpedo with any degree of accuracy. Nets were also used as protections across the mouths of harbors and were often dragged through a given area, in order to enmesh a submarine. After the United States entered the war the old-time custom of convoying ships was revived, and to this is probably due the great decrease in the numbers of merchantmen sunk in the latter part of 1917. Lastly, the indirect method of building tonnage faster than it could be sunk was attempted by rapidly increasing shipbuilding in the United States and other Allied and neutral nations.

There is no doubt that the German government determined to risk everything on the submarine campaign to bring the war to a successful conclusion. It must have known that the United States and other neutrals would not for a moment stand for the restriction of the use of the high seas. The Entente Allies reiterated time and again that Germany would ultimately be beaten because her chief weapon, the submarine, had not proved a thorough success.

Operations in the Baltic. Mine laying by Germany and Russia began in the Baltic at least as early as in the North Sea. As stated in the remarks upon North Sea operations, the Danes were forced by Germany to close the Baltic by mining their own waters, leaving passages only known to the German and Danish pilots, except close in to the Swedish coast. German mine fields were very freely spread over the southern part of the Baltic in addition to covering the approaches to all German ports. Of the Russian fields less is known, but it is certain that a very large number of Russian mines were placed, particularly in the gulfs of Riga and Finland, and merchant vessels and others were warned of fields covering the Russian coast and harbors south of Lat. 58° 50' N. and east of Long. 21° E.; also of mines in the channels of the Aland Archipelago. The difficulty of defending Libau and Windau against the German army was thoroughly understood and the ships, stores, and munitions held at these ports were transferred to Reval, Helsingfors, Kronstadt, and Riga. At Libau there is a dockyard of considerable importance, second only to Kronstadt in its capacity for repairs, but Windau was a torpedo-boat base only.

As soon as the relations with Russia became strained, German ships began to patrol the coast from Memel to the Gulf of Riga; on August 4, the light cruiser *Augsberg* bombarded Libau without effecting serious damage, and on the same day, a German expedition took possession of the Island of Aland, which lies in the straits connecting the Gulf of Bothnia with the Baltic and is only a short distance north of the Gulf of Finland.

On August 27, the German cruiser *Magdeburg* ran ashore in a fog on the Island of Odenholm and was blown up to avoid capture by an approaching Russian naval force. It was reported that early in September Admiral von Essen, who commanded the Russian fleet, painted a number of his vessels to imitate German ships, hoisted German colors, and contrived, in foggy weather, to join a German scouting expedition unsuspected. At a convenient moment he opened fire, sank one German cruiser (said to be the *Augsburg*), and badly damaged another, while his destroyers severely handled the smaller craft. Before the Germans fully recovered from their surprise, he withdrew his force and escaped without material injury. On September 24, a German scouting expedition of about 40 vessels of all kinds appeared before Windau, but after firing a few shots retired.

On December 12, the German armored cruiser *Friedrich Karl* was sunk by a mine and on the 25th the old cruiser *Hertha* and a mine layer were attacked by Russian cruisers and reported sunk. The Russian submarines were now becoming effective and, notwithstanding the ice, were cruising in the Baltic; their first victim was a German torpedo boat sunk off Cape Moen, and, at about the same time and place, the German cruiser *Gazelle* was torpedoed and badly injured. During the remainder of the winter and the early spring the ice interfered with prosecuting operations of importance.

In June, 1915, the Germans began operations along the coast in support of the land forces. While endeavoring to lay mines in the way of the German fleet a Russian mine layer was discovered and sunk. On July 2, a Russian cruiser squadron drove off a German light

cruiser of the *Augsburg* class and several destroyers and forced the mine layer *Albatross* to run ashore in a sinking condition. On the same day a British submarine is reported to have sunk a battleship of the *Pommern* class.

During the spring and summer of 1915, the Germans busied themselves in repairing and re-equipping Libau as a naval base and from there began operations against Riga. During the month of August they made several attacks in force, but all failed. The Russian gunboats *Sivoutch* and *Koreetz* were destroyed and at least one German destroyer was sunk. British submarines had now reached the Baltic in considerable numbers, passing under the mine fields or through the Sound and along the Swedish coast. Their presence acted as a strong check on German operations, especially after the German armored cruiser *Prinz Adalbert* was sunk (October 23) off Libau. Early in November, a British cruiser squadron escorted a flotilla of submarines (estimates of observers range from 10 to 25) as far as the Skaw (north point of Denmark). From there they were accompanied by a destroyer flotilla until well past Elsinore and safely inside the Baltic. The Germans learned of the operation too late to prevent it. They had already placed a new mine field at the entrance to the Sound but the British seemed to have been able to avoid it.

The large number of British and Russian submarines in the spring of 1916 in the Baltic were said to have not only stopped German operations to the eastward of Danzig, but to have effected a completely successful blockade of the German coast against vessels coming from Sweden, many of which had been captured and sunk, or warned and turned back (if neutral), while a large number were loaded in Swedish ports but were afraid to venture out. This practically completed the British naval cordon about the Central Powers. On November 7, a British submarine sank the German cruiser *Undine*, and on December 19, another submarine sank the German cruiser *Bremen* and a torpedo boat.

For the chief operation of the German and Russian Baltic fleets in 1917, consult MILITARY OPERATIONS, *Eastern Theatre*.

Operations in the Mediterranean. On the day after war was declared the German naval force in the Mediterranean bombarded undefended seaport towns in Algeria, the battle cruiser *Göeben* firing upon Philippeville and the light cruiser *Breslau* upon Bona. They then proceeded to Messina, Sicily, where they arrived on August 5. Being in a neutral port, they were required to depart within 24 hours; so, on the 6th, they left, steering south. Evading the British fleet which was seeking them, they were next heard of in the Dardanelles, where they arrived on August 11. Here they behaved to neutral steamers in a high-handed way which indicated German control of the Turkish government and foreshadowed the course taken by Turkey a short time later. To avoid immediate trouble for the Ottoman authorities they were supposedly sold to Turkey and renamed *Sultan Selim Javuz* and *Medillu*, but they apparently continued in command of German officers and retained a part at least of their German crews.

On August 9, Austria declared a blockade of the Montenegrin coast and bombarded Antivari. About the same date the French and British fleets established a blockade of the Austrian coast at the Strait of Otranto. The Austrians

had placed mine fields all along their coast, but their first victim was one of their own ships, the *Baron Gautsch*, which struck a mine on the 14th and sank at once with a loss of 67 lives. About the middle of August, the French and British forces swept up the Adriatic, driving the Austrians to the northward. They then attempted to take Cattaro for a naval base, but lacked the military force for a garrison and shore operations, and therefore failed. After a few weeks of futile bombardment of Cattaro and the Austrian positions on the Dalmatian coast they returned to the vicinity of Otranto Strait but continued to send scouting expeditions up the Adriatic.

The peculiar behavior of Turkey and the reported mining of the Dardanelles caused a British force to be maintained in that region. While on this duty the armored cruiser *Warrior* ran ashore and was injured on September 7. On the 10th, Turkey abrogated the capitulations with foreign governments and, during the latter part of October, permitted her vessels to sink Russian ships of war and attack Odessa. De facto war was begun by the Entente Allies on November 1; on the 5th, Great Britain formally declared war on Turkey and annexed the Island of Cyprus. On December 18, England declared a suzerainty over Egypt. On the 21st, the French submarine *Curie* was sunk while scouting along the Austrian coast. On November 24, Italy landed a force at Avlona to assist her protégé Essad Pasha against the Albanian insurrectionists.

In January, 1915, a Turkish army of about 12,000 men and six batteries of artillery attempted to seize the Suez Canal and then invade Egypt, where an insurrection had broken out fostered by Turkish emissaries. French and British vessels patrolling the canal succeeded in stopping the Turkish advance, and the operations at the Dardanelles then forced the recall of all available Turkish troops for the protection of Constantinople.

On February 24, the French destroyer *Dague* was sunk by a mine off Antivari. On April 28, the French armored cruiser *Léon Gambetta* was torpedoed by the Austrian submarine *U-5* and sank in 10 minutes. Rear Admiral Senes and all the officers were drowned, but 108 of the crew were picked up by French destroyers.

On May 24, Italy declared war on Austria; on the same day Austrian torpedo boats, supported by the light cruiser *Novara*, made a raid on the Italian coast, where they were first met by Italian destroyers and finally driven off by Italian cruisers. The Italian destroyer *Turbinia* was sunk early in the action. On June 10, the Italians captured Monfalcone with its shipbuilding yards.

On June 17, occurred a duel between an Austrian and an Italian submarine. As they approached, neither had any intimation of the presence of the other. The Italian boat, the *Medusa*, came to the surface first, swept the horizon with her periscope and, finding the vicinity clear, emerged. A few minutes later the Austrian decided to come up. When she sent up her periscope she saw the Italian boat close at hand and immediately torpedoed her. An officer and four men of the *Medusa* who were on deck when she sank were made prisoners. On July 1, the Austrian submarine *U-11* was sunk by a French aeroplane. *U-11* (860 tons) was lying on the surface when the aéro-

plane swooped down to within 45 feet of the water and dropped two bombs on the deck which caused her to sink almost instantly.

On July 7, the Italian armored cruiser *Amalfi* was sunk by an Austrian submarine while scouting in the upper Adriatic; nearly all the officers and crew were saved. On July 18, the armored cruiser *Giuseppe Garibaldi* was sunk by an Austrian submarine and a few of the crew were drowned.

The advent of Italy into the war completed the control of the Adriatic by the Entente Allies and, on July 6, Italy clinched the situation by a proclamation closing it to all merchant vessels not possessing special permits. Soon after the loss of the *Garibaldi* the operations of the Austrian submarines were much hampered by the destruction of their base on Lagosta Island by the French destroyer *Bisson*.

On or about August 13, the Austrian submarines *U-3* and *U-12* were sunk by the Italians. *U-3* was destroyed by gunfire, but *U-12* was sunk in a duel with an Italian submarine which torpedoed it. According to a report from Berlin, German submarines in the Mediterranean had, up to October 17, sunk 23 vessels, including four British transports.

On September 28, a fire broke out on the Italian battleship *Benedetto Brin* while she was lying at anchor in Brindisi harbor. The fire was quickly followed by an explosion which destroyed the ship. Of her complement of over 800 officers and men, only 8 officers and 379 men are known to have been saved.

On November 1, British torpedo boat No. 96 was sunk in collision at Gibraltar. On November 3, the British transport *Woodfield* was sunk by a submarine off the coast of Morocco; 6 passengers were killed and 14 wounded. About the same time the transport *Mercian* was attacked by gunfire from a submarine which probably had expended all its torpedoes. The *Mercian* was not sunk, but the casualties on board included 23 killed, 50 wounded, and 30 missing. On November 4, the French troopship *Calvados* was sunk by a submarine and between the 6th and 8th a submarine on the African coast sunk three small steamers, two Egyptian and one British. So far as reported only 53 of the 800 troops on the *Calvados* were saved. On December 5, the French submarine *Fresnel* ran aground while endeavoring to attack an Austrian light squadron. She was destroyed and her complement made prisoners. The Austrians report that at the same time they destroyed a small Italian cruiser.

During the month of December, the Italians landed a large force of troops in Albania. The expedition was most efficiently guarded against submarines and the only losses were the destroyer *Intrepido* and the troopship *Re Umberto*, which struck drifting mines. The loss of life in the two accidents was 43. In January, 1916, a cruiser of the *Novara* type was sunk by the French submarine *Foucault*.

The Italian dreadnought, *Leonardo da Vinci*, blew up in the harbor of Taranto on Aug. 2. The British transport, *Franconia*, was torpedoed on Oct. 5, and on Oct. 9, the French auxiliary cruiser, *Gallia*, was similarly sunk. The British ship *Britannic* was sunk by a mine in the Aegean Sea on November 21. On December 11, the Italian battleship, *Regina Margherita* struck a mine and sank and 675 lives were lost. In 1917, huge monitors operated successfully in the

attack on the Carso and in the defense of Venice. Light Italian motor boats armed with torpedo tubes were able to sail over the mine fields of Trieste and Pola, and in December, 1917, they entered Trieste harbor and sank two cruisers of the *Wien* type.

Operations in the Black Sea and Dardanelles. There are strong grounds for the belief that, at the outbreak of war, the Turkish cabinet was opposed to taking part in it, but that, as time went on, the German influence increased until the opposing members were won over, silenced, or driven from power. Among other significant facts it may be noted that the mining of the Dardanelles was not reported until August 19, eight days after the arrival therein of the *Goeben* and *Breslau*. On October 10, Turkey abrogated the capitulations with foreign powers concerning the jurisdiction of Turkish courts. By this time doubtless the cabinet had agreed upon its action, but much time was required to mobilize the army, and it is doubtful if the cabinet was ready to act when the operations of the *Goeben* and the Germanized fleet in the Black Sea precipitated matters. The commander in chief of the Turkish navy was now Admiral Souchon (late of the *Goeben* and the German Mediterranean squadron), while hundreds of German officers and 3000 men were distributed among the vessels of the fleet.

The first operations took place on October 29, when the Turkish squadron bombarded several Russian ports. A destroyer entered Odessa harbor, torpedoed and sank the gunboat *Donetz* and badly injured the *Kubanetz* (a sister to the *Donetz*), four merchant steamers (three Russian and one French), then fired upon the suburbs for the purpose of destroying oil tanks, but set fire to a sugar factory instead. On the same day the *Medilla* (ex-*Breslau*) bombarded Theodosia, seriously injuring the cathedral and other buildings; and the *Hamidieh* threatened to bombard Novorossisk if the city refused to surrender, but contented herself with embarking the Turkish consul. On their way to Sebastopol the Turkish destroyers sunk the Russian mine layer *Pruth*. The next day (October 30), accompanied by destroyers, the *Goeben* bombarded Sebastopol. By the return fire of the forts she was so badly injured that the admiral collected the squadron and returned to Constantinople. On November 7, the *Medilla* bombarded the small Russian town of Poti, but did no great damage. On the same day Russian forces shelled the Turkish ports of Zonguidak and Koslu, sinking at the former place three transports loaded with aeroplanes, artillery, and uniforms for 60,000 men; a colonel of the general staff, various German officers, and 248 soldiers were made prisoners. On November 17, the Russian squadron bombarded Trebizond, but without inflicting much damage.

On November 18, occurred the most important naval action that so far had taken place in the Black Sea. The Russian battleship division, returning from a cruise off the Anatolian coast, was about 30 miles from Sebastopol when the *Goeben* and *Breslau* were sighted. The *Evstafi* opened fire at about 8000 yards; the other ships following suit quickly. The Russians say that the *Goeben* was badly injured by the *Evstafi*'s first salvo and was slow in opening fire; and that, after an action lasting 14 minutes, she and her consort retreated towards Constantinople, being able to escape through their su-

periority in speed. As the *Goeben* did not appear in the Black Sea for some months afterward, the report of her injuries was possibly correct, though Turkish advices stated that, some little time after this battle, the *Goeben* was injured by striking a mine.

Early in December British submarines began to make their way through the Dardanelles. On December 13, the *B-11*, in command of Lieut. Norman D. Holbrook, entered the Dardanelles, dived underneath five rows of mines and torpedoed and sank the Turkish battleship *Messudieh*. This brilliant exploit was soon followed by others of a similar character.

During January the Russian fleet sank several Turkish vessels in the Black Sea, including a number of troopships and transports, and shelled the Turkish naval station at Sinope. On the 17th the French submarine *Saphir* was sunk by a mine in the Dardanelles.

About the middle of February the combined British and French fleets began their fruitless attempt to force a passage of the Dardanelles. No operations in the whole course of the war were so poorly conceived and so inefficiently carried out. It is hard to understand the folly of the British government in embarking upon such an expedition. If there is one thing that is well understood in naval war it is the absurdity of attacking strong forts by ships without adequate military support. Even if the ships can drive out the garrison it will return as soon as the bombardment ceases. Unless the fortifications are badly placed they cannot be wholly destroyed and the ravages of bombardment can be largely restored by a few days' work. Permanence of victory can only be obtained by occupying the works as soon as the defenders are expelled.

But this was not all. The Turks are an unready race. When the operations began they had not more than 10,000 men on the Gallipoli Peninsula, and these were inadequately supplied. The persistent attack of the Allied fleet showed the Turks that their enemies were in earnest in their endeavor to open the straits. Therefore the army on the peninsula was immediately increased in numbers until it is believed to have reached a strength of over 200,000 men, and supplies of all kinds were rushed to them. When the Allies finally landed their army it was too late; the defenders were ready for them. Even in their landing the Allies violated all strategic principles. Instead of coming with an overwhelming force and landing near the neck of the peninsula, where they could interrupt if not destroy the Turkish communications, they landed inadequate numbers near its extremity. Any gains made merely drove the Turks nearer to their base and strengthened their means of resistance. This fatal mistake was not due to the army or navy on the ground, but to the lack of equipment of the expedition which needed water tanks, water carts, hose, pumps, and other means of supplying water and other necessities and, above all, more men. The net loss to the Allies was 100,000 men, six battleships, seven submarines, and many other vessels; also a tremendous loss of prestige, the addition of Bulgaria to the list of their enemies, the loss of Greece and Rumania to their side, the opening of Turkey to supplies of men and munitions from Germany, a vital hampering of Russian operations through the failure to open the straits for their grain and supplies, a

renovation of the Turkish army, Turkish courage, and Turkish determination, the destruction of Serbia, and a prolongation of the war by many months. The only gain was a temporary recall of the Turkish troops sent to invade Egypt. As this expedition was as ill-planned as were the British operations at the Dardanelles, its success was impossible and its recall unimportant.

As already stated, the operations began in February. Several bombardments of the forts were carried out and considerable injury inflicted upon them. The ships, much hampered by bad weather outside, then entered the straits for closer work. On March 18, the British battleships *Ocean* and *Irresistible* and the French battleship *Bouvet* were sunk by mines and the British battle cruiser *Inflembable* badly injured by gunfire. The plan of forcing the passage by battleships was then given up and the second phase of the operations soon began. In the meantime the British submarine *AE-2* was sunk in the Sea of Marmora, the *E-15* run ashore and destroyed in the Dardanelles, and the Turkish cruiser *Medjidieh* sunk by a mine near Odessa (she was refloated in May by the Russians). Late in April the British and French troops were landed under fire at the Dardanelles. On May 12, the British battleship *Goliath* was sunk by a Turkish destroyer in a night attack; the battleships *Triumph* and *Majestic* were sunk by submarines a few days later, the former on the 22d, the latter on the 27th. The British submarines were very active at this time in the Black Sea and Sea of Marmora, sinking many vessels, chiefly transports and troopships, but on August 8 they sank the old Turkish battleship *Kheyr-ed-din Barbarossa* and the Turkish gunboat *Berk-i-Satvet*. The commander of one submarine swam ashore and destroyed a bridge on the Turkish line of communications; this was done in the actual presence of the Turkish patrol. In June the German *U-51* was sunk in the Black Sea and the German submarine base at Smyrna destroyed.

About August 1, the French submarine *Mariotte* was sunk. During the summer many British transports and troopships were destroyed by German submarines, the most important being the troopship *Royal Edward*, which was sent to the bottom on August 14 with the loss of 800 lives; but the sinking of the troopships *Ramazan* (Br.) and the *Marquette* (Fr.) were disasters almost equally great.

In the Black Sea the Russians seemed to have been unable to blockade or capture the *Medilla* (ex-Breslau) or the *Hamidieh*. In October the *Sultan Selim Javuz* (ex-*Goeben*) appeared again in the Black Sea but accomplished nothing of importance and seemed to be partly disabled. On November 3, the French submarine *Turquoise* was sunk by gunfire in the Sea of Marmora; on the 5th the British submarine *E-20* was reported missing and *E-7* as sunk. On November 10, the British destroyer *Louis* was sunk.

The Dardanelles operations were now admitted to be a failure, and the British began to transfer their troops to Saloniki. The operations in the Black Sea still continued but by the summer of 1916 had become of no special importance since the Turkish navy had been reduced to impotence. On Oct. 20, 1916, the *Imperatrice Marie*, a Russian dreadnaught, blew up. In 1917 over 200 Turkish sailing vessels were destroyed by the Russian fleet.

Cruiser Operations in the Atlantic, Pacific, and Indian Oceans. At the outbreak of war the only German vessels beyond the reach of home ports were the battle cruiser *Goeben*, the armored cruisers *Scharnhorst* and *Gneisenau*, the fast cruisers *Karlsruhe*, *Breslau*, *Emden*, *Dresden*, *Nurnberg*, *Königsberg*, *Leipzig*, and a number of small cruisers and gunboats. To these were quickly added several fast merchant steamers, the *Kaiser Wilhelm der Grosse*, *Kronprinz Wilhelm*, *Prinz Eitel Friedrich*, *Cap Trafalgar*, and *Spreewald*. These had their armaments on board or in German colonial ports.

The operations of the *Goeben* and *Breslau* are described elsewhere in this article. The *Scharnhorst* and *Gneisenau* were, after the *Goeben*, the most important vessels on the list and were under the command of Vice Admiral Count von Spee, the only German flag officer outside of European waters. After the commencement of hostilities these vessels were first heard of at Tahiti, where they bombarded the port of Papeete and sunk the French gunboat *Zélée*. The *Nurnberg*, after cutting the America-Australia cable at Fanning Island, joined Von Spee's squadron. He then proceeded to the west coast of South America, where he met the *Dresden* and *Leipzig*.

On the afternoon of Nov. 1, 1914, Rear Admiral Sir Christopher Cradock,* with a squadron consisting of the armored cruisers *Good Hope* (14d-2g9.2, 16g6-23k) and *Monmouth* (10d-14g6-23k), the fast light cruiser *Glasgow* (4.8d-2g6, 10g4-26k), and the armed merchant steamer *Otranto*, was off the Chilean coast searching for German cruisers. The old battleship *Canopus* (13d-4g12-18k) was near at hand and proceeding to a rendezvous to join the squadron. About 4.20 P.M. smoke was seen to the northward and soon afterward Von Spee's squadron, consisting of the *Scharnhorst* (11.4d-8g8.2, 6g5.9-23k), *Gneisenau* (same), unarmored cruisers *Dresden* (3.6d-10g4.1-24k), *Leipzig* (3.2d-10g4.1-23k), and *Nurnberg* (3.4d-10g4.1-24k), was sighted heading south. Cradock seems to have much overestimated the fighting power of his squadron (especially in the heavy sea which was running) or underestimated that of the Germans. At any rate, he sent a wireless message to the *Canopus* at 6.18 saying: "I am going to attack the enemy now," ordered the speed increased to 17 knots, and headed to the southeast, the Germans being between the British and the coast. At 7.03, the enemy opened fire at about 11,500 yards, quickly followed by the British. The superiority of the German ships was at once apparent. The heavy seas made it almost impossible to work the British 6-inch guns on the lower decks (and most of them were on that deck), and one of the *Good Hope's* 9.2-inch pieces was put out of action very early in the fight. Fires broke out in the forward turrets of the *Good Hope* and *Monmouth* at about the third German salvo, possibly from accumulated ammunition. At 7.50 a tremendous explosion occurred on the *Good Hope* amidships, the flames reaching an altitude of 200 feet. The *Monmouth* was already out of action, down by the head, and leaking badly. The night had become so dark that for some time the Germans aimed at the flames on the doomed vessels, both

of which had ceased firing altogether before 8 o'clock. A rain squall coming up added to the difficulty of pointing the guns, so Von Spee signaled the light cruisers to attack the enemy's ships with torpedoes. The *Good Hope* could not be found and had probably gone down, but the *Nurnberg* discovered the *Monmouth* and, by gunfire at close range, caused her to capsize. In the darkness and thick weather the *Glasgow* and *Otranto* got away without difficulty. As this fight took place in a very rough sea, it is doubtful if the *Good Hope* could use more than four of her sixteen 6-inch guns or the *Monmouth* more than five of her 14. The disabling of one of the 9.2-inch guns of the flagship by a lucky shot hastened the catastrophe.

The result of the action created a profound excitement in Europe, particularly in England, and added much to the prestige of the German navy. The British Admiralty immediately took steps to meet the situation by secretly dispatching a squadron under Vice Admiral Sturdee in pursuit of Von Spee. This consisted of the battle cruisers *Invincible* (17d-8g12-27k), *Inflexible* (same), the armored cruisers *Carnarvon* (10.8d-4g7.5, 6g6-23k), *Cornwall* (same as *Monmouth*), *Kent* (same), the fast cruiser *Bristol* (sister to the *Glasgow*), and the *Macedonia* (10,500 tons), supply steamer. At some rendezvous on the South American coast they were joined by the *Canopus* and *Glasgow*. About 8 o'clock on the morning of December 8, while Sturdee was coaling in the adjacent harbors of ports William and Stanley, Falkland Islands, the leading ships of the German squadron were sighted. Knowing nothing of the battle cruisers, the Germans came leisurely on, apparently intent upon destroying the wireless station. At 9.20, they were within 11,000 yards and the *Canopus*, still at anchor, opened fire on them over the lowland. They then turned to the southeast to rejoin the main body which immediately proceeded to the eastward at full speed. At 9.45, the British squadron came out and started in chase. About 1 P.M., the *Invincible* and the *Inflexible* began firing on the rear ships of the German column and a little later were able to reach the armored vessels and leave the others to the cruisers. About 3.30, the *Scharnhorst* changed course about 10 points (112.5 degrees) to starboard, presumably to bring her starboard battery into action, because of injury to her port guns, or to repair damages. At 4.04, she began to list heavily to port and at 4.17, sank with all hands. The *Gneisenau* continued the hopeless fight, though after 5 o'clock she was hors de combat. At 6 P.M., she heeled very suddenly and sank. About 100 survivors were picked up. These state that the ammunition had given out, although by the time it was exhausted over 600 of the complement had been killed or wounded. Of the German light cruisers, the *Leipzig* was sunk by the fire of the *Glasgow* and *Cornwall* about 9 P.M. and the *Nurnberg* by that of the *Kent* at 7.27. Seven officers and 18 men were saved from the two ships; many others lost their lives through being chilled by the coldness of the water. The *Dresden*, which escaped, was discovered off the island of Juan Fernandez on March 14, 1915, by the *Glasgow*, *Kent*, and auxiliary cruiser *Orama*. After an action of five minutes' duration she surrendered, but was on fire and soon afterward blew up. The *Dresden's* cruise as a commerce destroyer was not very eventful. After

* Sir Christopher Cradock (1862-1914), born at Hartforth, Yorkshire; served in the Sudan, China, etc.; rear admiral (1910); K.C.V.O. (1912); commander of training squadron (1912); received several awards for saving life; published *Sporting Notes in the Far East* (1889), *Wrinkles in Seamanship* (1894), *Whispers from the Fleet* (1907).

leaving the West Indies she sank the British steamer *Hyades* off Pernambuco about August 22 and the *Holmwood* near Rio de Janeiro, August 29. After her escape from the battle of the Falklands, she sank the *Conway Castle* off Chile on February 27.

Of all the German cruisers the *Emden* (3.6d-10g4.1-24k) had the most spectacular and successful career. On August 1, she left Tsingtao. On the 6th she captured a vessel of the Russian volunteer fleet and sent her into Tsingtao. She then went to the southward. On September 16, the British S.S. *Kabinga* arrived at Calcutta with the crews of 5 others that had been captured and sunk by the *Emden* which was now accompanied by the German auxiliary cruiser *Markomannia* and the Greek collier *Pontoporos*. Several British and French cruisers were at once started after her. On September 16, she coaled in False Bay and on September 18, sank the *Clan Matheson*. On the 22d, she appeared off Madras and shelled and set fire to the oil tanks of the Burma Oil Company. On the 24th, she reached Pondicherry after sinking five more British steamers. On her way around Ceylon, in three days, she sank five British steamers and captured a collier with 7000 tons of Welsh coal. She then went to the Maldive Islands which she left on October 1. She spent the 5th to the 10th at Diego Garcia, Chagos Islands, cleaning her bottom and boilers. Leaving her tenders to proceed to some unknown rendezvous, she went to the vicinity of the Laccadive Islands where she sank five steamers and a dredger, and captured another collier, but sank it also after filling her bunkers. On October 16, her tenders were captured by the British cruiser *Yarmouth*. At early daylight of October 29, with a dummy fourth smokepipe she entered Penang harbor (1700 miles from the Laccadives), her hostile character wholly unsuspected, sank the Russian cruiser *Jemtchug* and a French destroyer, and escaped without injury. On November 9, she approached the Cocos Islands to destroy the wireless station. Before she could effect a landing, the operators signaled her appearance broadcast and the report was picked up by the convoy of some Australian troopships bound to the Suez Canal and not far away. The cruiser *Sydney* (5.4d-8g6-26k) was detached to chase her, and came in sight while the *Emden* was waiting for her landing party. Leaving these men behind, she attempted to escape, but the *Sydney* was faster and carried a heavier battery so that in a short time she was badly injured and forced to run ashore. Of the 361 in her complement, all except 10 officers and 198 men were killed or drowned. Among those saved, fortunately, was her distinguished captain, Commander Karl von Müller, whose conduct throughout the cruise was brave, skillful, and chivalrous. During her remarkable career of 94 days the *Emden* captured or sank 30 vessels, destroyed \$25,000,000 worth of enemy property, almost paralyzed the commerce of the East, and had 19 war vessels of the enemy seeking her.

The *Königsberg* (3.4d-10g4.1-24k) was less successful. After a cruise of two months along the South African coast, in which she destroyed several British merchant ships and the small cruiser *Pegasus*, she was blockaded in the Rufiji River, German East Africa. After several attempts, she was finally destroyed by a British expedition on July 11, 1915.

The *Karlsruhe* (4.8d-12g4.1-27k) operated in

the Atlantic. Up to Oct. 24, 1914, she had captured and destroyed 17 British vessels.

Of the German armed merchant steamers, the *Spreewald* was captured by the armored cruiser *Berwick* on September 12. The *Kaiser Wilhelm der Grosse* had a still shorter career, being sunk on Aug. 7, 1914, by the British cruiser *Highflyer*. On October 14, the *Cap Trafalgar*, which was beginning to interfere with the British trade to South America, was sunk by the British armed steamer *Carmania*, late of the Cunard line. The *Kronprinz Wilhelm* and the *Prinz Eitel Friedrich*, after long and successful cruises as commerce destroyers, entered United States waters and were interned at Norfolk. The *U-53* entered the harbor of Newport, R. I., Oct. 7, 1916, delivered a letter to the German Ambassador and torpedoed 3 British and 2 neutral steamships just outside the 3-mile limit. In Jan., 1917, a raider sank 30 ships worth \$20,000,000 in the South Atlantic. In Aug., the *Seeadler* was wrecked near the Fiji Islands after sinking several ships.

Immediately after war was declared, the Entente Allies began perfecting arrangements for the capture of German colonies. On Aug. 7, Togoland was seized by land forces. On Aug. 27, Japan declared a blockade of Kiaochow, and on Nov. 7, Tsingtao, the German stronghold in China, surrendered to the Allied forces—chiefly Japanese. Early in August, a New Zealand expedition sailed for Samoa. At Noumea, the convoy—which was a weak one—became strengthened by the battle cruiser *Australia* (19d-8g12-27k) and the cruiser *Melbourne* (9.5d-2g7.6,8g6.4-21k). The expedition arrived at Apia on August 30 and the German Governor surrendered at once as he had practically no means of resistance. On its return from Samoa, the Australian squadron captured Herbertshöhe, the capital of the Bismarck Archipelago, and, on September 27, took possession of the town of Friedrich Wilhelm in Kaiser Wilhelm's Land (German New Guinea). During September and October, Australian and Japanese expeditions seized the remaining German possessions in the Ladrone, Marshall, and Caroline Islands.

For a discussion of blockade and the submarine warfare against noncombatants, see the section in this article headed NEUTRAL NATIONS.

Naval Strategy of the War. There is much reason to believe that Germany strongly hoped for the continued neutrality of Great Britain and her original naval plans are said to have been based on this supposition. The High Seas fleet was off the coast of Norway, leaving behind it in the Baltic a sufficient force to hold the Russian navy in check. Had England not entered the war, the High Seas fleet would have proceeded to the west coast of France, defeated the inferior French fleet, and established a base for the landing of an army of large size in the French rear. The advent of England changed all this. The High Seas fleet was withdrawn to the Kaiser Wilhelm Canal and a submarine warfare begun. With this, it was hoped to reduce the British forces to a size that would render victory possible. But the British battle fleet kept behind defenses that were submarine proof and instituted a blockade and antisubmarine warfare by means of unimportant vessels. Raids in force on the British coast only served to bring into view the battle-cruiser squadron and its speed and skillful handling prevented sub-

marines from scoring. In the meantime, the British were building battleships, cruisers, and submarines at a rate of speed that the Germans could not equal. After six months, during which the naval conditions were becoming less and less favorable to Germany, submarine warfare against British commerce was commenced, but this failed seriously to check British trade and was almost as costly to Germany as to her enemies. The Mediterranean field was then exploited as affording a better chance to avoid antisubmarine warfare and giving some support to the Balkan and Asiatic operations; but this transfer of submarine activity did not seriously hamper the Entente Allies or facilitate their own work.

The total effect of the German naval strategy upon the conduct of the war therefore was small and that strategy may be regarded as a failure. Should England strip herself of effective troops too closely at any time, an invasion might be attempted as a last resort. A preliminary success would add to the invading army all the German prisoners in England and they would only need arms and ammunition to create a serious condition of affairs. To secure such a result, the sacrifice of the German fleet might not be too great.

The main principles of British naval strategy appeared to be: (a) to hold the German fleet blockaded and be prepared at all times to give battle and bring into action forces superior to any which may have to be met; (b) to protect the British coast against an invasion in force; (c) to effect a commercial blockade (not declared) of Germany and prevent the importation of supplies of any kind or the exportation of wares, which could be sold for cash or exchanged for a desirable equivalent; (d) to protect British trade and destroy all German cruisers or other vessels that might interfere with it; (e) to facilitate and assist in the military operations of the Entente Allies and hamper those of the enemy.

The tactical operations occasionally failed but the strategical objectives were attained except in the case of the Dardanelles. The mistakes made in this dismal failure are elsewhere considered. See *Operations in the Black Sea and Dardanelles*.

Some Naval Lessons of the War. Submarines.—The exact value of the submarine as a weapon of war is not yet determined though it is unquestionably great. It is certainly an antagonist to be feared by all surface ships, but it is by no means so dangerous as many once thought it. Its most serious weakness is its vulnerability. If rammed with much force or struck by a single small shell it will sink, but double hulls and submerged water-tight decks may, in future large boats, greatly improve their ability to stand punishment. While it is being improved and rendered more effective and dangerous, so are its foes. The most important of these are the destroyer and the aeroplane; but under certain conditions the wire (in many cases, tubing) net and the swift motor boat are most efficient. As the immediate cause of destruction of submarines the destroyer ranks first, but the aeroplane can sight a submarine when too deeply immersed to show her periscope and thus warn surface vessels of her exact locality; in several instances during the war, aeroplanes sunk submarines by dropping bombs on them. Among the important qualities

of the submarine are its suitability for secret scouting, its capacity for defense against a close blockade, and its availability for protecting surface ships against the enemy's submarines.

Battleships and Battle Cruisers.—Battleships have had as yet no proper test in the war. Battle cruisers are in great favor and are found to be of inestimable value in many ways, but they are not able to stand very much punishment.

Torpedo.—The German short-range torpedo, with its enormous bursting charge, is a very deadly weapon, rarely failing to sink the enemy. Long-range torpedoes of the future are likely to be larger than existing types and have heavier bursting charges. Against the disruptive effect of so great an amount of explosive no method of subdivision of hull is adequate and some other means must be devised if surface battleships are to continue in use. On some of their old cruisers the British built external coffer dams along the sides. These greatly reduce the speed and their efficiency against torpedoes was not tested so far as known.

Old Battleships and Cruisers.—All the belligerent navies have found much use for old ships that were no longer fit for their designed purposes. In future, such craft are likely to be retained much longer than was hitherto considered desirable.

Monitors.—As a support to military operations, light-draft monitors have proved to be valuable. Their low speed in connection with small draft renders possible adequate hull protection against torpedoes, and their draft enables them to get close in shore where the ordinary battleship could not operate.

Light Cruisers are all now fitted with thin armor belts at the water line and the value of this is said to have been demonstrated, especially when scouting against destroyers. The necessity of the highest practicable speed is unquestionable and the battery, instead of many small guns, should consist of a less number of larger ones.

Bombardment of Forts.—The futility of bombarding forts with ships, unless an adequate landing force is available to take advantage of the work of the ship's guns, has been conclusively shown in the past and received another convincing proof at the Dardanelles.

Air Craft.—The value of air craft as scouts for their fleet was clearly demonstrated, and further important uses indicated, though as yet untried. As detectors of submarines, aeroplanes are invaluable adjuncts to a fleet. Airships are also valuable, but as constructed at present, large ones can only operate from a base on shore. See section on **AERIAL OPERATIONS**.

Big Guns and High Angle of Elevation.—Perhaps the most definite of the lessons of the war was the dominance of the big gun. Its greater range and destructive power gave the victory in every instance at sea in which the fight lasted to a finish. But, in the battle off the Falklands, the high elevation which it was possible to give the German 8.2-inch guns enabled them to open fire almost as soon as the 12-inch pieces of their opponents; and, in the battles in the North Sea, the advantage of high angle of elevation was again noted.

V. AERIAL OPERATIONS

The outbreak of the war found the Great Powers of Europe ready and anxious to make

immediate application of aeronautics to their respective military and naval operations. That all were inadequately prepared on the score of equipment and trained personnel the opening weeks of the war soon showed, and early the demands likely to be made on the aerial services were clearly indicated. But in no field did developments follow more rapidly, and as early as the Germans undertook the invasion of Belgium and France it was realized that aeroplane and airship had worked materially to change the nature and scope of military operations and to render obsolete tactics and movements that long had prevailed in warfare. By affording to scouts and intelligence officers a complete view of the enemy's territory, the disposition and movement of his troops and fleets, and his permanent or even his most temporary defenses, surprise or flanking movements were rendered practically impossible. With both sides adequately informed as to the forces of their adversaries through constant aerial scouting and reconnaissance, the tendency towards trench fighting and the protracted sieges and bombardments of the western front was as pronounced as it was inevitable. The direction and control of fire from an observation or kite balloon or aeroplane early became an indispensable feature of the work of the artillery. The tactical changes wrought by the use of air craft were stupendous, and the service of security and information by aerial observers and range finding for the artillery became essential features of the everyday work of the forces in the field. In addition there were raids by aeroplane and airship to drop explosive or incendiary bombs on fortified positions, moving columns, railway trains, supply depots or munitions works, or on warships, submarines, and transports.

Such activities on the part of the airmen soon became so valuable in a military sense that the prevention of these efforts was essential, and this naturally led to the development of the purely combative side of aerial warfare, which soon passed from individual duels in the air to savage actions often at close range participated in by a number of aeroplanes of different types, where battle tactics of an elementary form were evolved as a result of training and drill to secure harmony of action.

Naturally this led to increased armament and armoring of the aeroplanes, and the calibre of the rapid-fire gun that soon took the place of the automatic pistol became greater, so that by 1916 an air battle was indeed a serious matter, and the protection of fuel tanks and machinery and the design of machines to withstand as much penetration of the wings as possible figured prominently, as indeed did the entire question of design and construction for power, carrying capacity, speed, ease of manoeuvring, and general reliability. Remarkable advances were realized, along with wholesale demands which taxed the facilities for manufacture in the belligerent nations as well as in America.

Flying corps existing in armies and navies were on the outbreak of the war greatly augmented and preparations made to train vast numbers of aviators. It was estimated that the various belligerent nations on the outbreak of the war possessed about 5000 aeroplanes and 109 dirigibles. Naturally Germany, where some 12 Zeppelins and about 23 Parseval and Gross airships and about 1000 aeroplanes were avail-

able at the beginning of the war, was preëminent as regards numbers and trained pilots and observers; but here the policy of standardization and organization contributing so much to her efficiency in other fields was not of corresponding avail. A year's service, even less, demonstrated that much of the equipment so carefully assembled and standardized soon became obsolete and inferior with respect to the rapid developments that war conditions were bringing out for the Allies.

While the Germans had trained men in their aviation corps the French, with perhaps some 31 airships of nonrigid or semirigid types and possibly 1200 military aeroplanes of different design, had fewer enrolled aviators at the outbreak of the war in actual service, but had a large number of expert civilians and their machines to call upon, so that soon there was organized a body of men whose equipment, both available and rapidly supplied, represented the note of progress ever peculiar to the French in this field. The organization and drill of the various units was done with remarkable military skill and care.

Great Britain, distinctly inferior in organization and equipment as well as numbers, for its aeroplanes hardly totaled 500, and its dirigibles but 15, at the beginning of the war endeavored speedily to repair these deficiencies, and while the defensive efforts to repel the Zeppelin raids were crowned with but moderate success, British aviators at the front and at sea achieved a good record. Russia with 16 small airships and perhaps 800 aeroplanes, many of which were in poor shape, suffered from an inadequacy of equipment, while in Austria and Italy from the outset aerial war was waged by both Powers with a fair degree of preparation.

Aerial activity in war became not only important but indispensable under modern conditions, yet it did not have a direct and primary effect on the progress of the war itself comparable, let us say, to the activity of the submarine. Indirectly the influence of air craft on warfare proved enormous, but two years of experience indicated that there was but little direct military advantage in the attempts at wholesale destruction of noncombatants, buildings, and material by aeroplane and dirigible, although in the summer of 1916 the discharge of high explosives on the German trenches aided considerably the attacks of the Allies. The numerous air raids over Great Britain resulted in little positive military advantage, and the "frightfulness" that they were to inspire soon gave way to a feeling of intense irritation on the part of the invaded. That they were solely for the purpose of destruction by way of reprisal or otherwise was not believed by many military and naval authorities, even British, who urged that the raids were a part of an elaborate and highly developed system of reconnaissance carried on in connection with naval operations, especially by submarines and raiding cruisers, with whom they were in communication through wireless. Nevertheless these raids were of special significance, as they indicated future possibilities in the way of invasion and a menace that was ever at hand, and naturally they bulk large in any history of the war. Accordingly it may be desirable to consider some of the more effective raids on the great cities and at considerable distances from home bases.

Early in the war various places were attacked

with bombs dropped from aëroplanes and dirigibles, and naturally such incidents aroused widespread interest for their novelty. At first some pretense was made to comply with Article 25, Annex to Hague Convention, Oct. 19, 1907, which declared "The attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended, is prohibited." The addition of the words "by whatever means" was for the purpose of making it clear that the bombardment of these undefended places from balloons or aëroplanes was prohibited. This rule was ratified without reservations among other countries by Belgium, France, and Great Britain, as well as the United States, and with reservations by Germany, Russia, and Austria. The declaration (Oct. 18, 1907) to prohibit "for a period extending to the close of the Third Peace Conference the discharge of projectiles and explosives from balloons or by other new methods of a similar nature" was ratified among other nations by Great Britain, Belgium, and the United States. Germany, France, Austria, and Russia refused to ratify. See *INTERNATIONAL LAW, International Law in War*.

It was claimed that cities like Paris and London were in reality fortified camps, or equivalent thereto, and as such were liable to attack without warning; while if civilians were killed when towns supposed to contain supply stations, railway centres, palaces, or headquarters were bombed the injuries were to be considered incidental rather than intended. The raid of the Allies on Freiberg, e.g., which was said to be unfortified, was considered by the Germans an act in violation of the rules of war and led to reprisals. The bombing of hospitals and buildings protected by Red Cross flags figured also in the charges and recriminations that these aërial attacks provoked.

In the early weeks of the war a Zeppelin dropped bombs over Antwerp, and at the end of August and on September 1, 2, and 3, 1914, Taube monoplanes made daily visits to Paris, where, as in London, all street and other lights were extinguished and means hastily improvised to defend the city by searchlight and anti-aircraft guns as well as to organize special fire-fighting facilities to deal with the results of incendiary bombs. On Oct. 11, 1914, another raid was made on Paris and bombs were dropped, some of which fell on the cathedral of Notre Dame, while others damaged streets, sewers, and the underground railway, besides causing the deaths of some three persons and injuries to 14. In the meantime the aërial defense of the city was being developed, but on March 22, 1915, another raid was made on Paris, which, while resulting in little damage, nevertheless emphasized the need of a more complete system of defense. This was organized under General Hirschauer, former chief of the aëronautical department, and after it had been developed Paris was free from attack for many months. There was a system of central control with the battle front, aviation parks, and other stations connected by telephone, and frequent anti-aircraft batteries, many mounted on high-speed motors, not to mention searchlight and observing stations equipped with microphonic detectors, were provided at carefully chosen points. There were a number of completely equipped aëroplane stations each ready to send aloft its complement of machines at a moment's notice. A patrol was maintained with the aëroplanes flying at

different levels, drilled to intercept a hostile machine from both above and below.

Naturally an air attack on the British Isles was the goal aimed at by the Germans. Various reconnoissances were made by the Germans in connection with the flights on the western front and the observation of the British navy, but it was not until Dec. 5, 1914, that the reporting of a German aëroplane over Dover brought home to the British the reality of aërial danger. On December 24, bombs were dropped on Dover, and the following day a German biplane dropping bombs near Chatham was engaged by three British machines and was driven down the Thames, presumably to its destruction, as later the body of a German aviator was found near the river mouth. But the first serious raid on Britain was on the evening of Jan. 19, 1915, and was directed against Yarmouth, Sandringham, and other points on the Norfolk coast. This raid evidently was designed to test the capabilities of the Zeppelins for extended service, yet even at the time it was thought by English naval critics to be for the purpose of securing information as to the British fleet and for possible bomb dropping on shipyards and iron-works. This raid was but a beginning, for by June 1, 1914, the metropolitan section of London was reached and considerable damage was done, four lives being lost, while on June 6 another raid attended by casualties was made on the east coast of England, and again on June 15, on this last 16 persons being killed and 40 injured. Little of this nature then happened, save for a raid on Harwich, until Aug. 9, 1915, when a raid in considerable force was made, and bombs were dropped on warships in the Thames, on London docks, on torpedo boats near Harwich, and on military posts on the Humber. This raid was the forerunner of the activity promised by Count Zeppelin in the previous spring, when he stated that by the following August there would be available 15 airships of a new type. The casualties of this raid, on which some five airships started, were stated at 25, about half of which were deaths, while a number of fires were set.

Following this raid came one on the night of August 12 against Harwich, where 6 were killed and 17 wounded, while a squadron of 4 Zeppelins in another raid over the English east coast killed 10 and wounded 36 besides damaging various houses and other buildings. This was the eighteenth raid on Great Britain, making a total of 85 killed and 267 injured by bombs. The attacks of the Zeppelins reached perhaps a climax on September 8-9 when the heart of London was reached, and the Zeppelins flying over Trafalgar Square were distinctly visible from the street. The casualties of this raid were given as 20 killed, 14 seriously injured, and 74 slightly wounded, while the material damage was considerable. These raids continued during September over parts of the eastern counties. On October 13-14 London was again attacked by Zeppelins, which, fearful of searchlight and gunfire, flew very high with a corresponding effect on the accuracy of their bomb dropping. The roll of casualties included 46 killed and 114 wounded. For a few months now there was a lull in the aërial attacks on Great Britain, but the most serious raid came on the night of Jan. 31, 1915, when six or seven Zeppelins passed over the midland counties, dropping over 300 bombs and generally

terrorizing the inhabitants, the aim being to strike a blow at the industrial centres. Here 61 were killed and 101 injured, and the total number of the killed for 29 raids since the beginning of the war was 266. Beginning March 31, 1916, air raids were made over Great Britain for five successive nights and not only the eastern counties but even Scotland and the northeast coast were visited and bombs dropped. In one of these raids the Zeppelin *L-15* suffering severely from gunfire was forced to descend and was captured by the British.

The aerial defense of Great Britain came in for considerable criticism both within and without Parliament and unfavorable comparison with that maintained in France was made, but there were fundamental differences in the nature of the problem. Paris was behind a carefully guarded military frontier and all approaches were by land, while Great Britain, surrounded by water and often enveloped in fog, presented a much better opportunity for attack given an aeroplane or airship that could maintain itself in air long enough for a sustained flight. Many Englishmen urged that too much had been done for defense and not enough in the way of offensive movements against the Zeppelins in their home ports and stations.

Such raids as those described stand out apart from their actual military significance, but they must not be allowed to eclipse the daily routine and the ever-increasing number of frequent combats on all the battle fronts of this great war. What was remarkable at the beginning of the war, such as visits of the German Taubes to Paris in August, 1914, or the bomb dropping by a Zeppelin on Antwerp on September 1, of the same year, soon became commonplace as did the bombing of the German hangars at Düsseldorf and Cologne by the Allies later in the month. Attacks on Friedrichshafen by the British and on Freiberg by the French followed, while a British raid on Cuxhaven on Dec. 25, 1914, was an early example of a number of aeroplanes working together. Aerial attacks and reconnoissances in force became more frequent, ever on a larger scale and with greater elaboration of organization as well as with more powerful and more heavily armed machines. To deprive the enemy of the services of aviators and machines and to prevent their use for purposes of advantage now became a prime military necessity with a direct bearing on operations. Patrols were maintained more effectively, the service of security and information carried on daily in spite of hostile interference, while for the gunners in and behind the trenches ranges and directions were observed in the unprecedented bombardments that took place from time to time. Bombing raids by aeroplanes were organized on a large scale by the French especially with their heavier machines and many of these were very successful. While both sides continually lost many aeroplanes in actual fighting, the Germans suffered severely with respect to their Zeppelins by accident as well as by gun fire. The first Zeppelin to succumb as the result of aeroplane attack was on June 7, 1915, when a Canadian aviator, Sublieut. R. A. J. Warneford, R.N., in a Morane monoplane encountered the German airship *LZ-38* flying at a height of about 6000 feet between Ghent and Brussels. Getting directly above the Zeppelin he was able to land a bomb squarely on the envelope so that the resulting explosion entirely destroyed the

dirigible. There were further accidents to the German Zeppelins during the autumn and early winter of 1915, the Russians destroying an airship by artillery fire near Kalkun on the Libau-Benin Railway on December 5. Another notable achievement was the bringing down of the German naval Zeppelin *LZ-77* by an incendiary shell from a 77-mm. anti-aircraft gun of a French motor section at Brabant-le-Roi on Feb. 21, 1916. The shell ignited the gas bag. On May 3 the naval Zeppelin *L-20* was forced to descend on the Norwegian coast where it was blown up to preserve neutrality, while on May 5 one Zeppelin was destroyed by gunfire from French warships over Saloniki and another by the British off the coast of Schleswig-Holstein.

Along with the brilliant feats of individual aviators there was developed a tendency towards tactical formations and the use of many machines. In August, 1915, at one occasion 84 French aeroplanes were assembled for flight over the German lines, difference in speed and armament making possible tactical dispositions of the greatest advantage. The Germans for a time had some machines of superior armament and from August, 1915, heavier guns and armored aeroplanes figured and operations by flotillas became more general, these including the use of powerful bombing machines accompanied by armored scouts for their protection and swift flying machines for advanced reconnoitring. Air craft were also used at sea against warships and transports and in August, 1915, the Russians employed seaplanes against a German gunboat near Windau accompanied also by a Zeppelin and two seaplanes. Aeroplanes were also in evidence in the south and east, for the Russians attacked Constantinople in August dropping bombs on the harbor forts and from this time both sides were in active aerial warfare until the close of the Dardanelles campaign. On August 10 the Russians brought seaplanes to bear in repelling the landing of German troops off the Gulf of Riga.

Everywhere there was aerial activity and damage wrought by air craft, yet unavoidably this was accompanied by wholesale destruction of machines and losses of aviators. As samples of aerial attacks, and in fact but little more here can be attempted, mention may be made of the bombing of a poison gas plant at Dornach on Aug. 26, 1915, by a French aviator and a bomb attack on the royal palace at Stuttgart, a step it was announced taken in retaliation for German bomb dropping on unfortified towns and civilians. In every kind of operations air craft aided as at the battle in the attack on Artois Sept. 25, 1915, when the British airmen were prominent, and later at Verdun in the spring of 1916. On the western front in April, 1916, French airmen brought down 31 hostile aeroplanes. On October 3, a group of 19 French aeroplanes essayed an attack on Luxemburg, where the Kaiser had established headquarters.

In the south, Austrians were active against Italy, and bombing raids were made against Brescia, Verona, Venice, Udine, and other points, while the Italians in turn made attacks on Austrian territory. On Nov. 28, 1915, occurred the first battle between British and German seaplanes near Dunkirk with damages to both sides, while on November 29 a British seaplane destroyed a German submarine off the Belgian coast.

Typical of a day's work for the airmen may

be mentioned the British War Office report of Dec. 19, 1915, which announced 44 combats in the air on the western front. In April, 1916, French airmen on the western front brought down 31 hostile aeroplanes, while in the struggle around Verdun aeroplanes of both sides were in constant service. In the great drive of June and July, 1916, the Allies' aeroplanes participated actively, and reports made mention of extraordinary effects attending the dropping of powerful explosives on the trenches. The aeroplanes also made many raids in the rear. Airmen mostly French were active with the eastern army in the Balkans where the intense cold put many difficulties in their way. Around the Suez Canal the aeroplanes were invaluable in supplying information of threatened movements.

In 1916 everywhere there was increased aerial activity, a more active patrol service was maintained, and actions were frequent and serious. At sea aeroplanes were searching out for submarines and scouting, and employment of airship and aeroplane before and in a large naval battle for scouting and reconnoissance in a manner and on a scale somewhat corresponding to their use on land found a notable opportunity in the great fight off Jutland on May 31, 1916.

The year, 1917, marked the ever-increasing importance of the aeroplane as a military asset. It has been called the eyes of the army and has lived up to this name more and more as the great battles of the year were fought. In the battle of the Somme and during the great German retreat General Haig depended on his air service to find out just what the Germans were doing and how far they had retreated. It appears, however, that the Germans began their movement without being discovered by the British. We find the aeroplane probably used to its greatest advantage in the spring and summer campaigns on the Italian front and during their retreat to the Piave. Fleets of 150 or more machines would fly low to the ground and drop bombs on forming troops, lines of communications, and munition dumps, or they would rake the enemy with machine gun fire. Some of the giant Caproni planes could carry without any difficulty 10 or more men. One of the interesting outgrowths of increased aerial activity was the development of the "camouflage" system. This means the covering of trenches, artillery and other things of military value with trees, painted scenes etc., so that they could not be distinguished from the rest of the landscape from the air. These were of particularly great value inasmuch as airplanes were compelled to stay 2 or 3 miles in the air as anti-aircraft guns were improved.

England was the scene of many airship and aeroplane raids during 1917. The first one occurred on the night of March 16-17. The last one previous to this occurred in November, 1916. The southeastern counties were attacked with comparatively little material damage and no military damage whatever. On their return to home soil one Zeppelin was brought down near Compiègne by French anti-aircraft guns. The crew of 30 was killed. On May 7 German airplanes dropped bombs northeast of London without doing any damage. On the same day the Zeppelin L-22 was brought down in the North Sea by a British naval plane.

Between May 23 and June 16, 1917, five aerial attacks were made on England. In almost all of these the Germans used aeroplanes instead

of Zeppelins. In one attack on May 25, 76 men, women, and children were killed and 174 wounded. Three of the planes were shot down as they were homeward bound across the channel. Twenty German planes took part in the attack. On June 5, 16 planes bombarded the coast towns in Kent and Essex. Two more were shot down. They were unable to penetrate the outer defenses of London. The worst raid of the month was on June 13. It was carried out in broad daylight and resulted in the death of 97 persons, of whom 26 were school children, and the wounding of 437. On June 16 two Zeppelins bombarded the Kentish coast and killed 2 and wounded 16. One of them was brought down in flames on British soil and the entire crew was killed.

On July 4 another great raid was made on England. Eleven persons were killed and 36 injured at Harwich. Two German machines were lost. London was again attacked by a fleet of 20 airplanes which penetrated all the defenses. Thirty-seven people were killed and 141 injured but the British Admiralty announced that while the material damage was heavy the military damage was practically nothing. Eleven persons were killed and 26 wounded when two German aeroplanes dropped bombs on Felixstone and Harwich on July 22. The Essex coast was raided on August 12 with a loss of 23 lives and 50 injured. Two hostile machines were destroyed. On August 22 Yorkshire, Dover, Ramsgate, and Margate were raided during which 11 were killed and 13 injured. The Germans suffered heavily in this raid, losing 8 Gotha machines. On September 3 bombs were dropped on the naval station at Chatham, killing 108 and wounding 92. On the moonlight night of September 4, 11 were killed and 62 hurt in a raid on London.

Raids were made by German airmen on England on September 24, 25, 29, 30, and October 1. As a result of these 52 were killed and 216 injured. The Germans carried them out with scarcely any loss to themselves, British reports only claiming to have destroyed two machines. One of the most disastrous raids from the German point of view was made on the night of Oct. 19, 1917. At least 11 Zeppelins participated and on their way home, five were lost in French territory. One was captured undamaged at Bourbonne-les-Bains. Twenty-seven were killed and 53 wounded as a result of this raid. On October 31, 30 aeroplanes attacked London but only three got through the defenses. Eight were killed and 21 injured. On December 6, 25 Gotha planes attacked London, killing 10 and injuring 31. On December 18, 20 aeroplanes raided Kent, Essex, and London and killed 10 and wounded 70. In these last two raids, three planes were forced to descend, and their crews were taken prisoners. A careful compilation of British government reports show that from the beginning of the war to Jan. 1, 1918, 616 persons had been killed and 1630 wounded.

The consensus of opinion among the Allied nations was that these raids were of no military value and were merely another form of Germany's "frightfulness." Public opinion in England and France demanded reprisals, but for physical reasons the governments refused to heed the popular clamor. Instead they gave their attention to the aerial bombardment of purely military centres such as the submarine bases at Ostend and Zeebrugge and the Krupp

works at Essen. France made one or two spasmodic attempts to retaliate by bombarding towns in Alsace and Lorraine, but they met with little success.

It would be impossible in a work of this kind to attempt to describe the engagements in the air over the battlefronts. Hundreds of them occurred every week and few of them stood out more than others for daring, success, etc. So far a method of tactical warfare had not been evolved by either of the belligerent sides. The engagements were mostly individual, even when the machines travelled in groups. To give an idea of the aeroplane's activities, it was officially reported that on the western front alone 717 machines were brought or driven down in April, 1917, 713 in May, 467 in July, and 704 in September. Accurate figures are not available for the losses on the other fronts.

With the entrance of the United States into the war it was felt that as soon as her resources were available the supremacy of the air would pass once and for all to the Entente Allies. She devised the standardized "Liberty Motor" which was supposed to contain the best points of all the foreign aeroplanes in one engine.

The verdict of three years' use of aeroplanes and airships confirmed in the main previous theory and prediction. The aeroplane demonstrated itself an important and essential element of modern warfare both on land and sea. The airship, which in the hands of the Germans increased vastly in efficiency as the war progressed and was found valuable for oversea scouting and reconnaissance and bomb dropping, may cause damage, serious and costly; but that it contributed anything worth while to the settlement of the war or greatly affected its progress or outcome was not proven by three years of use in 1914-17. As regards relative technical or military advantage by January, 1918, it was more difficult to say. The aerial services of the Allies in organization and extent had developed to a greater degree than those of the Teutonic Powers and had become more efficient with ever-improved machines and heavier armament, but throughout the war German and Austrian aviators fought most valiantly, and the limited success achieved by the Zeppelins was due to their inherent nature rather than to unskillful operation. See AERONAUTICS; HANGAR; MILITARY AERONAUTICS; NAVAL AERONAUTICS.

VI. ALLEGED ATROCITIES

Belgium. Shortly after the occupation of Belgium by the Germans, reports reached the outside world of shocking atrocities alleged to have been committed by the German army during the invasion. To ascertain, if possible, the truth of these reports, the government of Great Britain appointed a commission of prominent English statesmen and jurists headed by Viscount Bryce to investigate the matter. Depositions of more than 1200 persons were considered by the commission. From the evidence accumulated the commission reached the following conclusions:

1. That there were in many parts of Belgium deliberate and systematically organized massacres of the civil population, accompanied by many isolated murders and other outrages.

2. That innocent men, women, and children in large numbers were murdered and women violated.

3. That looting, house burning, and wanton destruction of property were ordered and countenanced by the officers of the German army.

4. That women and children were used as a shield for advancing military forces.

In answer to these charges the German government issued a memorandum specifying the acts of civilians in Belgium, in violation of the rules of war, such as shooting at German soldiers from private houses, and mutilating wounded Germans, which, they claimed, justified the German military authorities in their acts of reprisal.

Great resentment was aroused in England by the action of the German military authorities in executing Miss Edith Cavell,* an English nurse who was accused of utilizing her position to assist in the escape of Belgian, French, and British soldiers from Belgium.

Another incident which caused considerable adverse criticism of the German government was the case of Cardinal Mercier (q.v.), Archbishop of Malines and Roman Catholic Primate of Belgium. After a trip through the devastated parts of Belgium he wrote a pastoral letter describing the conditions which he had found. In passionate words he set forth the evidence of ruined villages, churches, schools, and monasteries destroyed. Efforts were made by the German authorities to suppress the letter, and the Cardinal was put under restraint, although not actually imprisoned by the German Governor of Belgium, Von Bissing.† In answer to a protest made by the Pope the German authorities stated that all restraints upon the Cardinal's freedom of communication with the clergy had been removed.

Armenia. The governments of France, Russia, and Great Britain issued the following joint note on May 23, 1915. "For the past months Kurds and the Turkish population of Armenia have been engaged in massacring Armenians with the help of the Ottoman authorities. Such massacres took place about the middle of April at Erzerum, Dertshau, Moush, Zeitun, and in all Cilicia. The inhabitants of about 100 villages near Van were all assassinated. In the town itself the Armenian quarter is besieged by Kurds." The preaching of a holy war soon after this increased the massacres to such an extent that the Armenian paper *Mshak* estimated that only 200,000 of the race still remained in the country, out of a total of 1,200,000 at the beginning of the war, and that 850,000 had been killed or enslaved by the Turks and 200,000 had migrated to Russia. The United States placed an informal request before the German Ambassador, asking that the German government attempt to alleviate the conditions of the Armenians. An informal reply said that the Armenian reports were greatly exaggerated. Charges of barbarous cruelty were laid before the Sublime Porte by the American Ambassador, Morgenthau. Turkey filed counter charges at Washington, stating that Russian troops, aided by Greeks and Armenians, had committed acts

* Edith Cavell was head of a nurses' training school in Brussels; as a nurse did much for German as well as Allied soldiers in European War. The American Minister, Brand Whitlock, made every effort to have her life spared. The execution roused England and France and was commented on throughout the United States. A notable memorial service was held at St. Paul's, London, and a statue of Miss Cavell by Sir George Frampton was to be erected adjoining Trafalgar Square.

† Moritz Ferdinand, Baron von Bissing, born (1844) at Bellmansdorf; rose to be lieutenant general (1897) and general of cavalry, commanding the Seventh Army Corps; after invasion of Belgium by the Germans was appointed Military Governor of the country.

of cruelty against Moslems in the Caucasus region, and that continual revolutions incited by the Allies were occurring in Armenia.

Poland. At the outbreak of the war Germany, Austria, and Russia attempted to gain the loyal support of the entire Polish nation by promises of the reestablishment of the old Polish Kingdom. Poles fought against each other in the hopes that a united Poland would result. In the great German drive into eastern Russia Poland was crushed and the inhabitants suffered untold hardships. As the Russians retreated they compelled the Poles to abandon their homes for military reasons. Any villages that escaped the Russians were almost invariably destroyed by the Germans. It is estimated that at least 20,000 villages were wiped out and that over 200 towns were completely destroyed. In the Gorlice district the Polish Relief Victims' Fund estimate that during the 18 months' campaign 1,500,000 noncombatants, caught between the contending armies, perished from hunger and disease. The Rockefeller Foundation reported that the entire civilian population faced a famine. The poorer classes were found to be existing in many cases on meatless soup and a crust of bread. There was no fuel to be had and many were frozen to death during the winter of 1915-16. Attempts were made to feed the Polish sufferers through an American committee, but Germany and Great Britain could not agree as to method.

Serbia. The conditions in Serbia were practically similar to those in Poland. Villages and towns were wiped out in the face of the German drive through the Balkans. After the first drive of the Austrians into Serbia fever epidemics broke out all over the country. It is presumed to have been caused by the congestion of all the rural population in the urban districts as a result of the war. Hundreds died daily, and in many places it was impossible to bury all the victims. Physicians were sent to Serbia by the Allies and hospital units were made up in the United States and sent over. Cholera also broke out among the noncombatants after the German drive. It was caused by the shortage of food and the bad sanitary conditions, the people being forced to herd together and to live in the open. It is estimated that over 600,000 noncombatants died as a result of the plague and from hunger.

VII. DESTRUCTION OF ART AND ARCHITECTURE

The great war saw the destruction or mutilation of many of the landmarks of Europe in the field of art and architecture. Charges and countercharges were made by the belligerents of deliberate attempts to destroy these. The destruction of a large part of the city of Louvain, including its church of St. Pierre, the University of Louvain (q.v.), and its library of rare books and manuscripts aroused much feeling in all civilized countries. In defense of its action the German general staff issued an official communication in which it was stated that the civilian population, after the surrender of the city to the Germans, had fired upon German soldiers from private houses, as a result of which five officers were wounded. It was also claimed that the Belgian authorities had encouraged a general uprising of the civilian population against the Germans. The case of Louvain figured largely in the American press, but it was only one of nu-

merous similar instances where towns and villages containing gems of art and architecture had been burned and many of their inhabitants shot because they had resisted invaders.

The beautiful cathedral of Rheims (q.v.), dating from the thirteenth century, suffered irreparable damage from repeated German bombardments. The Germans, in explanation of the first bombardment, maintained that the French had established an observation post in its tower. It is doubtful if the exquisite carvings, statuary, and stained glass windows can ever be replaced. Another city to suffer was Ypres (q.v.). Its famous Cloth Hall was seriously damaged during the heavy bombardments of the Flanders campaign.

There was constant danger to architecture of historical interest from the frequent aerial attacks on cities. For example, during an Austrian raid on Venice bombs fell on the Scalzi Church. The ceiling, which was ornamented with beautiful sculpture of Tiepolo, was crushed. Historic landmarks of London and Paris narrowly escaped damage from Zeppelin raids.

VIII. NEUTRAL NATIONS

A war involving all of the great industrial nations of Europe was certain to have far-reaching effects upon all neutral nations. The complete dislocation of international trade and the closing of all the great stock markets of the world gave rise to financial and economic problems which were absolutely unprecedented. After the first shock the business interests gradually adjusted themselves to the new conditions. But soon it became apparent that problems far more serious than those produced by the temporary disturbance caused by the outbreak of the war, confronted the neutral nations. To the questions of neutral trade, contraband and blockade, which had arisen in previous wars, there were added new and more vexing problems due to the introduction of new methods of warfare, especially the operation of the submarines.

United States. As the largest and most important of the neutral Powers, the United States was sure to be vitally affected. This country was looked to by the smaller neutral nations to champion the interests of all neutrals. Moreover, it was certain that the United States would be called upon to furnish large quantities of supplies to the belligerent Powers. Each of the belligerents would be anxious to avail themselves of this source of supply, and each in turn would strive to prevent their opponents taking advantage of it. Under these conditions the situation which confronted the United States authorities in attempting to maintain strict neutrality was a trying one, and the problem was made more difficult by the attitude of groups of persons in this country whose sympathies were with one or the other of the belligerents in Europe. The following are the most important questions which arose involving the United States and the various European Powers.

Blockade and Neutral Trade.—During the early months of the war Great Britain established her complete control of the seas, except in so far as it was interrupted by the operations of the German submarines. That Great Britain would take full advantage of her sea power was to be expected, and that in so doing serious difficulties would arise in regard to the rights of neutral nations was also clear. In the first place

there was the always vexed question of contraband. There was no Hague Convention which dealt with the question of conditional and absolute contraband. As the Declaration of London (see LONDON, DECLARATION OF) was declared by Great Britain not to be in force, the question had to be determined by the general rules of international law. But upon this question there was no general agreement among the nations. Belligerent Powers naturally wished to extend the list of contraband, while neutral Powers quite as naturally wished to restrict it.

A more serious and difficult question affecting neutrals arose, due to the peculiar geographical position of Germany. On two sides the country was bounded by neutral Powers which touched the sea. Through Holland and the Scandinavian countries contraband might be shipped from the United States or other neutral countries to Germany and thus nullify England's sea power. The problem which confronted Great Britain was to prevent contraband articles from reaching Germany, while at the same time not to interfere with legitimate trade between neutral countries. Shortly after the outbreak of hostilities Great Britain began detaining American ships bound for neutral ports on the ground that their cargoes were destined for the enemy. For some months the United States government did not protest, hoping that Great Britain would modify her policy. Finally on Dec. 26, 1914, the United States addressed a communication to Great Britain, calling attention to the interference by the latter with American commerce with neutral nations, on the ground that goods so consigned might reach the enemies of Great Britain. The United States authorities contended that "mere suspicion was not evidence and doubts should be resolved in favor of neutral commerce, not against it." To this note Great Britain replied on Jan. 7, 1915, that that country had not aimed to interfere with the bona-fide trade of the United States with neutral countries, but figures were given showing the marked increase in exports of such articles as rubber and copper from the United States to neutral countries contiguous to Germany. It was stated that with such figures the presumption was very strong that such goods were ultimately destined for a belligerent country. The note further stated that Great Britain was prepared to admit that foodstuffs should not be seized without the presumption that they were intended for the armed forces of the enemy. In regard to the placing of cotton on the list of contraband it was stated that the British government had not contemplated any such action. In conclusion the British government agreed to make reparation for any injury improperly done to neutral shipping.

A novel question arose from the action of the German government in placing under government control all of the food supply of the Empire. The British government declared that it would be impossible under these conditions to distinguish between food intended for the civilian population of Germany and food to be used by the German military forces. In view of this situation the British government stated that foodstuffs intended for consumption in Germany would be considered contraband.

For some months after the outbreak of the war Great Britain hesitated to declare a blockade of German ports. This attitude was due, in part at least, to the recognized difficulty of rendering such a blockade effective, in view of

the geographical position of Germany, and of the activities of submarines. But events forced Great Britain to abandon her somewhat anomalous position. On March 1, 1915, Mr. Asquith announced in the House of Commons that Great Britain and France, in retaliation upon Germany for her declaration of the "War Zone" around the British Isles (see below), would confiscate all goods of "presumed enemy destination, ownership, or origin." Such action, of course, could only be justified under the existing rules of international law on the presumption that a lawful blockade of German ports had been declared. In answer to an inquiry from the American government as to whether such a blockade was contemplated the British government stated that as an effective "cordon controlling intercourse with Germany had been established and proclaimed, the importation and exportation of all goods to or from Germany was, under the accepted rules of blockade, prohibited." The British government further defined the radius of activity of the French and British fleets in enforcing the blockade as European waters including the Mediterranean. It was further stated that they would refrain from exercising the right to confiscate ships and cargoes for breaches of the blockade, and restrict their claim to stopping cargoes destined to or coming from the enemy's territory.

In an extended communication addressed to the British government by Secretary Bryan (q.v.) on March 30, 1915, attention was called to the unusual character of the proposed blockade and the interference with legitimate neutral commerce which might readily result. The United States government was willing to concede that the changed conditions of naval warfare, especially the operations of submarines, might justify some modification of the old form of close blockade, but it was unwilling to concede the right of belligerents to blockade neutral ports. It was further pointed out that alleged illegal acts of Germany could not be offered as an excuse for unlawful acts on the part of Great Britain. In conclusion it was stated that the German Baltic ports were open to the trade of the Scandinavian countries, although it is an essential element of blockade that it bear with equal severity upon all neutrals.

For some months the question was allowed to remain in abeyance, because more serious questions had arisen in connection with Germany's submarine warfare. (See below.) It was clear, however, that irritation at the continued interference by Great Britain with American commerce was constantly increasing. On Aug. 3, 1915, the State Department at Washington published five diplomatic communications which had been exchanged between the two governments relating to the detention of American ships and cargoes. In response to the American note of March 30, 1915, on the subject of the restrictions imposed on American commerce by the British Orders in Council, Sir Edward Grey defended the Orders on the ground that it was necessary for Great Britain and her Allies to take every step in their power to overcome their common enemy in view of the shocking violation of the recognized rules and principles of civilized warfare of which she had been guilty during the present struggle. He further denied that the Orders in Council violated any fundamental principle of international law by applying a blockade in such a way as to cut off

the enemy's commerce through neutral ports, "if the circumstances render such an application of the principles of blockade the only means of making it effective." It was contended that the only question that could arise in regard to the new character of blockade was whether the measures taken conform to "the spirit and principles of the essence of the rules of war" as stated in the American note of March 30, 1915. Sir Edward Grey contended that there was precedent for the British policy in the position taken by the United States during the Civil War. In order to prevent contraband being shipped from neighboring neutral territory to the Confederacy the Federal government enforced the doctrine of the continuous voyage and goods destined for enemy territory were intercepted before they reached the neutral ports from which they were to be reexported. Such action, moreover, was upheld by the Supreme Court of the United States in the case of the *Springbok*. The main argument of the British government was that when the underlying principles governing blockade and contraband are not violated it is permissible to adopt new measures of enforcement.

To this contention the United States replied with a vigorous note on Oct. 21, 1915. It was stated that the so-called blockade instituted by the Allies was "ineffective, illegal and indefensible," that the "American government cannot submit to a curtailment of its neutral rights and that the United States must insist that the relations between it and His Majesty's government be governed, not by a policy of expediency, but by those established rules of international conduct to which Great Britain in the past has held the United States to account."

This note did not have the effect of forcing Great Britain to modify her blockade policy. On the contrary Great Britain served notice, on March 30, 1916, that thereafter the doctrine of continuous voyage would be applied to vessels carrying conditional contraband as well as to those carrying absolute contraband. See NEUTRALITY: INTERNATIONAL LAW.

On April 25, 1916, the British government made an extended reply to the protest of the United States. It was contended that the practices complained of were "judicially sound and valid" and that the relief neutrals sought was to be obtained by mitigation of necessary hardships rather than "by abrupt change either in theory or application of a policy based upon admitted principles of international law carefully adjusted to the altered conditions of modern warfare." The note further stated that "an impartial and influential commission" had been appointed to find ways to minimize delays and pledged the Allies to make their restraints as little burdensome as possible. In regard to the complaint that the methods adopted by the Allies in intercepting neutral trade had not hitherto been employed by belligerents, it was answered that "new devices for dispatching goods to the enemy must be met by methods of intercepting such trade." In particular it was pointed out that modern conditions, such as the size of the steamships, and the methods of concealing contraband, made it no longer feasible to search ships at sea and justified sending vessels into port for search.

At great length the note discussed the question of proofs of the destination of contraband. As in a previous note it was contended that figures

issued by the United States Department of Commerce showed that exports from the United States to the Scandinavian countries had increased threefold since the outbreak of the war, and there was strong reason to believe that much of this increase was not bona-fide neutral trade. It was pointed out that large consignments of meat had been made to such persons as dock laborers, lightermen, bakers, etc., and it was obvious that such consignments were subterfuges. In view of these facts it was contended that "no belligerent could in modern times be bound by a rule that no goods could be seized unless they were accompanied by papers which established their destination to an enemy country. To press such a theory is tantamount to asking that all trade between neutral ports shall be free, and would thus render nugatory the exercise of sea power and destroy the pressure which the command of the sea enables the Allies to impose upon their enemies."

The note finally denied the statement made by the United States government that the blockade was ineffective. It was stated that it is doubtful if there had ever been a blockade where the ships which slipped through bore such a small proportion to those intercepted.

In 1916 another cause of dispute arose between Great Britain and the United States. On July 18 the British government published a blacklist of 82 American firms and individuals under the Enemy Trading Act, which forbid any business dealings between them and British citizens. On July 28 the United States protested that it was "inconsistent with that true justice, sincere amity and impartial fairness which characterize the dealings of friendly countries with one another." Britain replied that the act concerned only its government and citizens and left the American names on the blacklist.

This note did not bring the questions at issue, between the United States and Great Britain, any nearer to a settlement. It was evident that while Great Britain was anxious to adopt a conciliatory policy in dealing with neutral commerce, she was unwilling to concede the principle for which the United States contended, viz., that trade between the United States and neutral countries should not be interfered with.

Use of Neutral Flags.—Early in the year 1915, the German government made representations to the government of the United States that British ships were making use of neutral flags in order to escape capture. Particular attention was called to the action of the captain of the British steamer *Lusitania* in raising the United States flag when approaching British waters, and it was stated that orders had been issued by the British government to all commanders to make use of neutral flags when necessary. On Feb. 10, 1915, the United States government addressed a note to the British government calling attention to this matter. Without disputing that in exceptional cases there was precedent for the use of neutral flags by merchant vessels to escape capture, it was pointed out that any general use of the American flag for such purposes would endanger American ships, by raising the presumption that they are of belligerent nationality. In answer to this the British government stated, on Feb. 19, 1915, that English law allowed the use of the British flag by foreign merchant vessels in order to escape capture, that instances were on record of United States vessels making such use of the English flag dur-

ing the American Civil War, and that it would be unreasonable to deny to British vessels at the present time a similar privilege. It was stated, however, that the British government had no intention of advising their merchant shipping to use foreign flags as a general practice.

Interference with Mail.—A determined protest was also made by the United States government against the interference by Great Britain with neutral mail in transit between neutral ports. It was contended that under The Hague Convention postal correspondence on the high seas is inviolable. To this protest the British government replied that this provision was not intended to cover the shipment of contraband by parcel post, and in order to prevent such shipment Great Britain would insist upon the right to examine mail packages on the high seas.

Submarine Warfare and the War Zone.—The European War witnessed for the first time the use of the submarine on a large scale in naval warfare. It was evident that the introduction of this new weapon would give rise to a number of novel questions. The frail construction of these boats makes them an easy prey, if seen, for warships or even for unarmed merchantmen which might sink the submarines by ramming them. These conditions, it was contended, make it necessary for the submarines to attack quickly and without warning. Furthermore the old method of capture by which a prize crew was placed on the captured vessel could hardly be followed by the submarines as the size of the crew was small and could not be spared for this purpose. The only feasible method of disposing of vessels captured by submarines was to sink them. But this raised the question of the safety of passengers and crew. The established rules of international law required that merchant vessels could not be sunk, unless they attempted to escape, until provision was made for the safety of passengers and crew. The United States first became involved in the issue when on Feb. 4, 1915, Germany declared the waters around the British Isles a war zone after Feb. 18, 1915. It declared its intention of sinking every enemy merchant ship found in the zone even if it was impossible to save the crew and passengers. It also stated that neutral ships entering the war zone were in danger.

The United States government promptly took notice of this proclamation, and on Feb. 10, 1915, sent a communication to the German government calling attention to the serious difficulties that might arise if the policy contemplated were carried out, and declaring that it would hold the German government to a strict accountability if any merchant vessel of the United States was destroyed or citizens of the United States lost their lives. In reply to this note the German government stated on Feb. 18, 1915, that, in view of the illegal methods used by Great Britain in preventing commerce between Germany and neutral countries, even in articles which are not contraband of war, the German government felt justified in using all means within its power to retaliate on England. Complaint was made of the large quantities of munitions of war which were being sent to Great Britain, and it was stated that Germany intended to suppress such traffic with all means at its disposal. Finally, it was suggested that, in order to avoid mistakes, all American vessels carrying noncontraband through the war zone should travel under convoy.

In order to avoid, if possible, the very serious consequences of the proposed German naval policy, the government of the United States addressed an identical note to Great Britain and Germany suggesting an agreement between these two powers respecting the conduct of naval warfare. The memorandum contained the following suggestions: (1) That neither power should sow floating mines on the high seas or in territorial waters, and that anchored mines should be placed only in cannon range of harbors for defensive purposes, and that all mines should bear the stamp of the government planting them, and be so constructed as to become harmless when separated from their anchors. (2) That neither should use submarines to attack the merchant vessels of any nationality, except to enforce the right of visit and search. (3) That each should require their merchant vessels not to use neutral flags for purposes of disguise.

The note further suggested that the United States government designate certain agencies in Germany to which foodstuffs from the United States should be sent, and that the German government guarantee that such foodstuffs be used for noncombatants only. Great Britain was requested to agree not to put foodstuffs on the list of absolute contraband, and that ships of foodstuffs sent to the designated consignees in Germany should not be interfered with.

Nothing of practical importance came from these suggestions. Germany replied, accepting some and rejecting others, while Great Britain reviewed the alleged violations of international law and defended the stoppage of foodstuffs destined for Germany as a legitimate incident of the blockade.

Thus matters rested pending the first case in which an American vessel should be sunk or American lives lost. On March 28, 1915, news was received that the British steamship *Falaba* had been sunk and that among those lost was an American citizen, Leon C. Thrasher. Accounts differed as to the actions of the steamship when called upon by the commander of the submarine to stop. The German government defended the action on the ground that the *Falaba* had attempted to escape after being warned, and that, upon being overhauled, ten minutes had been allowed for the crew and the passengers to take to the lifeboats before the vessel was torpedoed. While this case was still under consideration by the United States government, it was reported that the American vessel *Cushing* had been attacked by a German aeroplane in the English Channel on April 29, 1915, one bomb being dropped on the ship which caused some damage but no loss of life. Within two days word was received that the American steamer *Gulflight* had been attacked by a German submarine off the Scilly Islands on May 1. Two members of the crew and the captain died. For history of this case see section, *Sinking of the Lusitania*.

The submarine controversy took a new turn, when the *Deutschland*, a commerce-carrying submarine, entered the port of Baltimore on July 9. The question immediately arose as to her status. The British and French embassies made strong protests about her being allowed to enter an American port, claiming that she was potentially a war vessel. The State Department announced on July 15 that the submersible would be considered a merchantman. It further stated that she could not be turned into a war vessel without radical changes in her construction. Conse-

quently she returned to Bremen. She later completed the round trip again, her port of arrival in the United States being New London, Conn.

The entire world was startled on January 31, 1917, when Germany announced to neutral countries that all restrictions on submarine warfare were to be removed and that a new policy of ruthless undersea activity was to be carried on in an attempt to bring England into a state of submission. In the note sent to the United States Germany stated that "the attempt of the four Allied Powers (Germany, etc.) to bring about peace has failed, owing to the lust of conquest of their enemies, who desired to dictate the conditions of peace. . . . To the wish of conciliation they oppose the will of destruction. They desire a fight to the bitter end. . . .

"In brutal contempt of international law, the group of powers led by England does not only curtail the legitimate trade of their opponents but they also, by ruthless pressure, compel neutral countries either altogether to forego every trade not agreeable to the Entente Powers or to limit it according to their arbitrary decrees. Thus British tyranny mercilessly increases the sufferings of the world; indifferent to the laws of humanity, indifferent to the protests of neutrals whom they severely harm, indifferent even to the silent longing for peace among England's own Allies. Each day of the terrible struggle causes new destruction, new sufferings. Each day shortening the war will, on both sides, preserve the life of thousands of brave soldiers and be a benefit to mankind. . . .

"After attempts to come to an understanding with the Entente Powers have been answered by the latter with the announcement of an intensified continuance of the war, the Imperial government—to serve the welfare of mankind in a higher sense and not to wrong its own people—is now compelled to continue the fight for existence, again forced upon it, with the full employment of all the weapons which are at its disposal."

Accompanying this note were two memoranda which described the new war zones and the conditions under which American ships might sail. The entire coasts of England and France were included in the zone as well as the coastline controlled by the Allies in the Mediterranean Sea. Entrance to England was along a narrow lane 20 miles wide leading to the port of Falmouth. A similar lane was mapped out for approach to Greece. Traffic of regular American passenger steamers was permitted if they followed a certain course and bore certain distinguishing marks, laid down by the German government.

The publication of the note in the United States brought forth a storm of protest and demanded immediate action. President Wilson addressed Congress on the 3d of February concerning the situation. He gave a brief sketch of the relations between his government and Germany over the submarine controversy and stated that the latter had broken its pledges, and in accordance with his principles laid down in the *Sussex* case (see *Question of Armed Merchantmen*) he concluded, "I have therefore directed the Secretary of State to announce to His Excellency the German Ambassador that all diplomatic relations between the United States and Germany are severed and that the American Ambassador at Berlin will be immediately withdrawn." Then followed a period of suspense in which the American government was apparently

awaiting an overt act before taking any further measures. Popular indignation was aroused when several vessels, carrying American citizens, were torpedoed, but no one of them constituted the overt act.

On February 26 President Wilson again went before Congress and requested "that you will authorize me to supply our merchant ships with defensive arms should that become necessary, and with the means of using them, and to employ any other instrumentalities or methods that may be necessary and adequate to protect our ships and our people in their legitimate and peaceful pursuits on the seas." On February 26 it was officially reported that on the 25th the *Laconia* was torpedoed without warning and two Americans were drowned.

Immediately after the dismissal of the German Ambassador, the United States government took steps to put the country in a state of preparedness commensurate with the importance of the situation. All navy yards and army posts were closed to the view of the public and the customary reports concerning the movements of naval vessels were no longer published. Amateur wireless outfits were ordered dismantled and all others were taken over by the government. Guards were placed over government plants and arsenals and the militia was called out in several of the States. The State troops and the police of several cities were placed on guard at important bridges, aqueducts, and reservoirs. The Panama Canal and all American ports were watched to prevent obstructions from being placed at strategic points.

In the meantime the House of Representatives was working on the largest naval appropriation bill in the history of the country. The bill which finally passed the House by a vote of 353 to 23, on February 12, appropriated \$363,553,338.07. This bill also gave to the President the power to commandeer shipyards and munition plants "in time of war or national emergency." One million dollars was appropriated to acquire basic patents for an aeroplane suitable for government work. The Emergency Act passed on March 4 gave the President the following powers: "(1) . . . to place an order with any person for . . . war material as the necessities of the government . . . may require, and which are . . . capable of being produced by such person. (2) . . . to modify or cancel any existing contract for the building, production, or purchase of . . . war material; and if any contractor shall refuse . . . the President may take immediate possession of any factory of such character. (3) To require the owner or occupier of any factory in which . . . war material are . . . produced to place at the disposal of the United States the whole or part of the output of such factory. (4) To requisition or take over for use or operation by the government any factory or any part thereof, . . . whether the United States has or has not any contract . . . with the owner . . ."

The President also announced that the Navy Department would proceed to mount modern guns on all American merchant vessels that were to sail for Europe. These ships were to include those that were carrying munitions to the Allies. Gun crews from the American navy were to man these guns, and with this crew rested the decision as to whether they should sink a German submarine. This would precipitate actual warfare.

The Mexican Note.—On March 1, there appeared in the newspapers of the country a most sensational disclosure of an intrigue between Ger-

many and Mexico. The statement was issued on the authority of Secretary of State, Lansing. This note dispelled from the mind of the public any hope that we might still keep out of actual warfare. The note was dated Jan. 19, 1917, and was sent to Herr von Eckhardt, who was the German Minister to Mexico. It states in part: "On the 1st of February we intend to begin submarine warfare unrestricted. In spite of this it is our intention to endeavor to keep neutral the United States of America. If this is not successful, we propose an alliance on the following basis with Mexico: That we shall make war together and together make peace. We shall give general financial support, and it is understood that Mexico is to reconquer the lost territory in New Mexico, Texas, and Arizona. The details are left to you for settlement . . . suggest that the President of Mexico, on his own initiative, should communicate with Japan suggesting adherence at once to this plan. At the same time, offer to mediate between Germany and Japan." . . . This note caused widespread amazement and indignation throughout the entire country. Japan hastened to affirm in no uncertain tones that she had absolutely nothing to do with the whole affair. If anything, the note strengthened the relationship between that country and the United States. The fact that only a few days before the exposure of the Zimmerman note Carranza had sent identical notes to all the American republics, including the United States, asking that the western hemisphere should cease to send any further supplies to the European countries, in order to bring about a speedier peace, was construed in the United States to be a sure sign of strong German intrigue in the Mexican republic. President Wilson courteously but firmly refused to acquiesce in the proposition.

The President's War Message.—The President issued a call for the New Congress to meet in special session on April 2. He had attempted to get plenary war powers from the old Congress before it went out of existence but he was unable to do so. Probably at no time in our history has a congress met to face such a crisis as the one that existed. Congress met at noon on the 2d of April and at 8:30 P.M. of the same day President Wilson delivered his war message. The following are extracts from the message: "I have called the Congress into extraordinary session because there are serious, very serious, choices of policy to be made, and made immediately. . . . The new policy (see note of February 1st above) has swept every restriction aside. Vessels of every kind, whatever their flag, their character, their cargo, their destination, their errand, have been ruthlessly sent to the bottom without warning and without thought of help or mercy for those on board. . . .

"I am not now thinking of the loss of property involved, immense and serious as that is, but only of the wanton and wholesale destruction of the lives of noncombatants, . . . engaged in pursuits which have always, . . . been deemed innocent and legitimate. Property can be paid for; the lives of peaceful and innocent people cannot be. The present German warfare against commerce is a warfare against mankind. . . .

"The German government denies the right of neutrals to use arms at all within the areas of the sea which it has prescribed, even in the defense of the rights which no modern publicist has ever before questioned their right to defend. . . . Armed neutrality is ineffectual enough at best; in

such circumstances and in the face of such pretensions it is worse than ineffectual; it is likely only to produce what it was meant to prevent; it is practically certain to draw us into the war without either the rights or the effectiveness of belligerents. . . .

"With a profound sense of the solemn and even tragical character of the step I am taking and of the grave responsibilities which it involves, but in unhesitating obedience to what I consider my constitutional duty, I advise that the Congress declare the recent course of the Imperial German Government to be in fact nothing less than war against the Government and the people of the United States; that it formally accept the status of belligerent which has thus been thrust upon it. . . . We have no quarrel with the German people. We have no feeling toward them but one of sympathy and friendship. It was not upon their impulse that their government acted in entering this war. It was not with their previous knowledge or approval. . . .

"A steadfast concert for peace can never be maintained except by a partnership of democratic nations. . . . It must be a league of honor, a partnership of opinion. . . . Only free people can hold their purpose and their honor steady to a common end and prefer the interests of mankind to any narrow interest of their own. . . . The world must be made safe for democracy. Its peace must be planted upon the tested foundations of political liberty. We have no selfish ends to serve. We desire no conquests, no dominion. We seek no indemnities for ourselves, no material compensations for the sacrifices we shall freely make. We are but the champions of the rights of mankind. We shall be satisfied when those rights have been made as secure as the faith and the freedom of nations can make them. . . .

"To such a task we can dedicate our lives and our fortunes, everything that we are and everything that we have, with the pride of those who know that the day has come when America is privileged to spend her blood and her might for the principles that gave her birth and happiness and the peace which she has treasured. God helping her, she can do no other."

Congress took immediate action on this address by the President, with the result that on April 6, 1917, the executive signed the joint resolution of the House of Representatives and the Senate to the effect that the state of war thrust upon the United States by Germany was formally declared. The President was also given power to call on the naval and military forces of the United States, as well as the resources of the government, to bring the war to a successful conclusion. On the same day President Wilson issued a proclamation to the people of the country, in which he called upon the enemy aliens to abide by the laws of the United States and not to do anything which would give aid and comfort to the enemy. If they followed out these instructions they would not be disturbed. Otherwise they could be apprehended, restrained, secured, and removed from the country as alien enemies.

The first act in recognition of the war was the seizing of German vessels in the ports of the United States and her dependencies. There were 91 ships in American ports with a gross tonnage of 594,696. The total value was estimated at \$100,000,000. In almost every case it was discovered that the machinery had been removed or destroyed in such a fashion as to make the immediate use of the vessels impossible. The government stated

that the ships were being seized to protect them from further damage until it could be decided what could be done with them. They were later turned over to machinists and were finally put in order and used as transports, etc., by the government.

War Preparations by the Army and Navy.—Long before the declaration of war the United States government was engaged in putting its physical forces into first-class condition. On March 25, an executive order was issued increasing the enlisted personnel of the navy to 87,000 men, and on March 26, another order was issued to increase the Marine Corps to 17,400 men. Immediately after the declaration of war the entire navy was placed on a war footing. The naval militia, the naval reserves, and the coast guards passed under the control of the Navy Department. A nation wide recruiting campaign was carried on to bring the navy and Allied services up to their war strength.

A large fleet of "mosquito craft" was organized to patrol United States waters against attacks by German submarines and raiders. At first this was composed of privately owned power boats that were purchased by or given to the government. These were later augmented by 80- and 110-foot "chasers," built of wood, fast, and carrying a small gun fore and aft. In the latter part of 1917, the construction of these was given up, because of their inability to stand rough seas and because the Navy Department decided the money could be better spent on fast destroyers. Defensive war zones around the coastline of the entire United States and its dependencies were laid out.

Plans for the mobilization of the army went forward just as rapidly as those for the navy. Before war was declared several national guard units were called out to do police duties at bridges, etc. The War Department announced that 26 camps, with a capacity of 25,000 men, would be established throughout the country for the giving of military instruction to civilians.

Council of National Defence.—The economic side of the war was put in the hands of the Council of National Defence, which consisted of the members of the President's cabinet and a civilian advisory committee composed of business men and leaders of industry. A number of boards were appointed consisting of a group of experts, who were to organize war activities along special lines. The Food Board was placed under the charge of Herbert C. Hoover, the executive head of the Belgian Relief Commission. This board was to take such measures as would conserve the food supplies of the United States, and at the same time, as far as possible, supply the needs of the Allies. It also dealt with questions of food shortages, distributions, mobilization of agricultural resources, price control, and waste. In November, 1917, it held a "conservation" week and thousands of families received conservation display cards, showing that they would observe "wheatless and meatless" days to aid the government. Other important boards were also instituted. A committee of five was appointed to direct the operations of American railways during the war. The railways were taken over by the government on December 28, 1917. A General Munitions Board had charge of supplying munitions and equipment to the army and of adjusting the question of whether the government needed a man more in the industrial or military field. The Economy Board was organized to take care of the commercial interests of the country and to purchase raw

materials for the government. A Medical Board was formed by many prominent physicians to mobilize and organize the medical men and resources of the country.

The Federal Shipping Board was one of the most important organizations established. Its problem was to defeat the submarine by building a vast fleet to transport the American army and great quantities of supplies to Europe. It was organized as a \$50,000,000 corporation with Colonel Goethals as general manager. It was to build 1000 wooden ships of from 3000 to 5000 tons burden. The efficiency of this board was marred by continual wranglings over the nature of the vessels to be built. The result was several changes in the personnel of the board with an apparent securing of harmony of action.

Enemy Aliens.—At the outbreak of the war there were approximately 5,000,000 enemy aliens in the United States. An official proclamation was issued which forbade any enemy alien from remaining or residing "within half a mile of any governmental fort, factory, reservation, base of supplies, or any land used for war purposes." This act was not carried out strictly by the United States marshal. Permits were granted which allowed an enemy alien to remain in the proscribed area if he obeyed the law. The gradual unfolding of vast German plots, the destruction of munition factories, incendiary burning of food supplies destined for the Allies, and the activities of American newspapers, compelled the government to take more stringent action. Various raids were executed in different sections of the country and several hundred "suspects" were interned. The result was that in November, 1917, the President ordered all enemy aliens to register, and gave the Attorney-General the power to establish forbidden zones about warehouses, factories, etc. There were to be no exceptions to this order. United States troops were also provided to guard the waterfronts of seaports.

The Draft Act.—In the President's message to Congress on April 2, he submitted the idea of raising a national army by conscription. There was a strong protest against this in both the House and the Senate, but after a month's debate the President's idea prevailed, and on May 18, 1917, the selected conscription act was passed. The President by proclamation set aside June 5 as the day on which all males who had reached their 21st but not their 31st birthday were to register for military service. Nine million, six hundred and fifty-nine thousand, three hundred and eighty-two men registered. This included aliens. In different parts of the country there were attempts to avoid the law. Many of the delinquents were given another opportunity to register and some of the recalcitrants were arrested. The law authorized the President to appoint a local exemption board for each county and one for each 30,000 population in cities of 30,000 or more. He was also to appoint a board for each Federal Judicial district, which was to review the decisions of the local boards. The President himself was the final court of appeal from the district court. The exemption boards were to be composed of civilians only. Those specifically exempted by the law were Federal and State officials and members of religious sects who had conscientious scruples against war. The President was authorized to exempt "persons engaged in industries, including agriculture, found to be necessary to the maintenance of the mili-

tary establishments or the effective operation of the military forces or . . . the national interest during the emergency."

The cards of registrants were numbered in a red ink serial up to the total number in the district. Alphabetical arrangement was forbidden. Then the numbers were drawn at Washington and the men were called according to the drawing, which took place on July 20. The men were medically examined and those who were physically fit and not exempted were sent to some one of the 16 military cantonments constructed for the training of new recruits. Six hundred and eighty-seven thousand were called in the first draft. After the first draft was completed the system of selection was changed (Nov. 1917). All the remaining registrants were divided into five classes, according to liability for military service. Those in the first class were to be called first, those in the second next, and so on.

Visits of Foreign Missions.—The entrance of the United States into the war was followed almost immediately by the sending of diplomatic missions to that country from most of the Allied nations. The purposes of these missions were to express a feeling of appreciation and gratification for America's action and to discuss ways and means of obtaining the most practical co-operation. The British mission was headed by Arthur J. Balfour and the French mission by Rene Viviani and General Joffre. They were everywhere greeted with wonderful outbursts of enthusiasm. Russia, Italy, Belgium, Serbia, and Japan also sent diplomatic missions.

Financing the War.—The United States government determined to raise the money necessary for the conduct of the war by three methods, (1) loans, (2) revenue under the existing laws, (3) new taxation. The Treasury Department decided to raise the money immediately needed by means of bond issues. Consequently books were opened, offering \$2,000,000 worth of 3½ per cent convertible gold bonds. The loan was called the "Liberty Loan." Subscriptions closed on June 15, 1917. Amounts were allotted to each of the twelve Federal Reserve districts and in practically every district the amount allotted was oversubscribed. The campaign was carried on with a great display of posters, ringing of bells, and speeches by prominent men. There were approximately 3,000,000 subscribers and the loan was oversubscribed by almost \$1,000,000. Books were opened for a second liberty loan on Oct. 1, 1917. These offered from \$3,000,000 to \$5,000,000 worth of 4 per cent convertible gold bonds bearing interest from November 15. As was the case with the first Liberty Loan, the second Liberty Loan bonds were enthusiastically bought by the American people. The maximum amount was approximately reached by means of 10,000,000 individual subscriptions. The War Revenue Act as passed in September, 1917, contained drastic taxation measures. An additional tax and surtax were levied on incomes and a graduated excess profits tax on corporations, partnerships, and individuals was put in operation. Internal taxes on tobacco, liquor, transportation, amusements, etc., and an increase in postal rates were expected to produce a vast revenue. The estimated cost of the first year of the war was \$18,500,000,000.

President's Address to Congress.—On Dec. 5, 1917, President Wilson delivered a very important message to Congress. He emphasized the fact that the only possible peace was one after a

military victory, when it would be negotiated with responsible representatives of the German people. He stated that international peace after the war must come from a partnership of peoples and not of governments. America would consider the war won when the German people are ready to agree to a settlement based on justice and reparation of wrongs their rulers have done. "Our present and immediate task is to win the war, and nothing shall turn us aside from it until it is accomplished. Every power and resource, whether of men, or money, or of materials, is being devoted and will continue to be devoted to that purpose until it is achieved. Those who desire to bring peace about before that purpose is achieved I counsel to carry their advice elsewhere. I will not entertain it." He asked for a declaration of war against Austria and it was declared on December 7. His speech created a profound impression both at home and abroad.

Peace Proposals.—The most important move towards peace occurred in December, 1916. On the 12th of that month, Germany, Austria-Hungary, Turkey, and Bulgaria submitted practically identical notes to the diplomatic representatives of the United States, Switzerland, and other neutral countries as well as to the Vatican. No terms were mentioned but the Allies were asked "to enter forthwith into peace negotiations." The notes were forwarded to the Allies without comment. Russia immediately refused to open any negotiations whatever. Italy and France made similar declarations. Lloyd George, the new premier of England, declared that little could be expected of the peace move now and that "the very appeal for peace was delivered ostentatiously from the triumphal chariot of Prussian militarism."

Rather unexpectedly the United States, on December 18, sent a note to the belligerent nations asking them "the precise objects which would, if attained, satisfy them and their people that the war had been fought out." Germany replied on December 26 that the only thing she was willing to consider was a meeting of representatives of the belligerent nations while the war was continued.

The Allied reply was received on Jan. 12, 1917. It was a compilation of the views of all the Entente Powers and demanded (1) restoration of Belgium, Serbia, and Montenegro with indemnities; (2) evacuation of invaded territories of France, Russia, and Rumania with reparation; (3) reorganization of Europe under guarantees to insure to all nations respect and liberty of development; (4) restitution of territories wrested in the past from the Allies by force or against the people's will; (5) liberation of Slavs, Rumanians, Italians, and Czechoslovaks from foreign domination; (6) enfranchisement of population subject to Turkey; (7) expulsion from Europe of the Ottoman Empire. This note effectively stopped for the time being all attempts to bring about peace, inasmuch as the world realized that the demands of the Allies could be gained only on the battlefield and not in a conference.

Pope Benedict's Peace Appeal.—In August, 1917, Pope Benedict sent an identical note to all the belligerent powers on the subject of peace. The note as translated by the State Department at Washington was published in the American newspapers on August 16. The first paragraphs stated that the Pontificate has made every effort to remain absolutely impartial and thus espouse

the cause of no one group of belligerents. It relates the unsuccessful attempts to mediate at the end of the first year of the war and then states the "base of a just and lasting peace." . . . First, the fundamental point must be that the material force of arms shall give way to the moral force of right, whence shall proceed a just agreement of all upon the simultaneous and reciprocal decrease of armaments, according to rules and guarantees to be established, in the necessary and sufficient measure for the maintenance of public order in every State; then taking the place of arms, the institution of arbitration, with its high pacifying function, according to rule to be drawn in concert and under sanctions to be determined against any State which would decline either to refer international questions to arbitration or to accept it awards."

The Pope then takes up the question of the war, and suggests absolute freedom of the seas. He also asks for mutual restitution of all territory that has changed hands during the war. "As regards territorial questions, as, for instance, those that are disputed by Italy and Austria, by Germany and France, there is reason to hope that, in consideration of the immense advantages of durable peace with disarmament, the contending parties will examine them in a conciliatory spirit, taking into account, as far as is just and possible, as we have said formerly, the aspirations of the population, and, if occasion arises, adjusting private opinions to the general good of the great human society." He suggested that the questions of the Balkan States, Poland, and Armenia might be settled on the same principles.

The press in Entente countries severely criticized the Pope's appeal on the grounds that it made no condemnation of Germany's atrocities, the invasion of Belgium, and the submarine warfare. The Pope replied to this by stating that he was acting as a peacemaker and not as a judge and that if he attempted to decide which set of belligerents was right his peace attempt was certain to be a failure.

On Aug. 27, 1917, President Wilson replied to the Pope's note through Secretary of State Lansing. It stated that, "Our response must be based upon the stern facts and upon nothing else." After reviewing the methods suggested in the Pope's note, the President's reply states: "It is manifest that no part of this programme can be successfully carried out unless the restitution of the *status quo ante* furnishes a firm and satisfactory basis for it. The object of this war is to deliver the free peoples of the world from the menace and the actual power of a vast military establishment controlled by an irresponsible government which, having secretly planned to dominate the world, proceeded to carry out the plan without regard either to the sacred obligations of treaty or the long-established practices and long-cherished principles of international action and honor; which chose its own time for the war delivered its blow fiercely and suddenly; stopped at no barrier either of law or of mercy; swept a whole continent within the tide of blood—not the blood of soldiers only, but the blood of innocent women and children also and of the helpless poor; and now stands balked but not defeated, the enemy of four-fifths of the world. This power is not the German people. It is the ruthless master of the German people. . . . They (the American people) believe that peace should rest upon the rights of peoples, not the rights

of governments—the rights of peoples great and small, weak or powerful—their equal right to freedom and security and self-government and to a participation upon fair terms in the economic opportunities of the world, the German people of course included if they will accept equality and not seek domination. . . . We cannot take the word of the present rulers of Germany as a guarantee of anything that is to endure, unless explicitly supported by such conclusive evidence of the will and purpose of the German people themselves as the other peoples of the world would be justified in accepting. Without such guarantees treaties of settlement, agreements for disarmament, covenants to set up arbitration in the place of force, territorial adjustments, reconstitutions of small nations, if made with the German government, no man, no nation can now depend on."

President Wilson's reply to Pope Benedict received the hearty approval of the press of the United States. Even the German papers printed in that country seemed to favor the note. The Allies of the United States, through their statesmen and press, endorsed the stand taken and the more enthusiastic of them hailed Mr. Wilson as the spokesman of the Entente. In Germany the government and pan-German organs bitterly attacked the President's note, claiming that it was nonsense to say that the German people were oppressed by an irresponsible government. They cited the fact that the entire German people had time and time again repeated that they stand firmly behind the government. The Socialist newspaper, *Vorwärts*, stated editorially, "The government of a country at war with us has a perfect right to demand that for the conditions under which peace is to be concluded the people themselves shall be the guarantee." Semi-official organs in France, Great Britain, Italy, and Russia announced to the world that the reply of President Wilson represented their own attitude toward the peace proposal.

The official replies of the German and Austro-Hungarian Empires were made public on Sept. 22, 1917. The main theme of both notes was identical. It was that both empires agreed with the Pope's desire to have the right of might give way to moral force. Both stated that arbitration with efficient guarantees should follow an immediate disarmament by all the nations of the world. Freedom of the seas and the right of independent economic progress were inalienable to all nations. The press of the Entente countries passionately attacked the replies, not so much because of what was contained therein, but because of what was not said. Nothing was said of the evacuation, restitution, and indemnification of Belgium, nothing of Alsace-Lorraine, nothing of Poland, Armenia, Trentino, etc. Subsequent statements by German diplomats refused absolutely to debate the question of Alsace-Lorraine.

Sinking of the Lusitania.—Before the government of the United States had formulated any action in connection with these cases the civilized world was shocked at the terrible news that the Cunard Line steamship *Lusitania* (q.v.) had been sunk on May 7, 1915, by a German submarine off Old Head of Kinsale at the southeastern point of Ireland, resulting in the loss of 1150 lives, of whom 114 were known to be American citizens. Prior to sailing of the *Lusitania* from New York on her fatal voyage, an advertisement signed by the German Embassy ap-

peared in many American newspapers warning Americans of the danger of traveling on British vessels through the war zone.

The first feeling of horror at the terrible catastrophe was succeeded by a feeling of bitter resentment in America at what appeared to be a ruthless sacrifice of innocent lives. It appeared, at first, as if a break between the United States and Germany were inevitable. President Wilson (see WILSON, WOODROW) waited six days before taking definite action, stating that it was important to act with deliberation as well as with firmness. In the meantime the German government, on May 10, 1915, sent a communication to the United States government expressing its sympathy for the loss of American lives, but at the same time maintaining that the responsibility rested with the British government, which through its plan of starving the civilian population of Germany by prohibiting the importation of foodstuffs, had forced Germany to resort to retaliatory measures. It was further claimed that British merchant vessels were generally armed, and repeated attempts had been made by such vessels to ram submarines. Finally it was stated that the *Lusitania* carried a large quantity of ammunition in her cargo and warning had been given by Germany that such vessels were liable to destruction.

On May 13, 1915, the eagerly awaited statement of the United States was sent to Germany. With a dignity and an earnestness which the gravity of the situation called for, President Wilson reviewed the series of acts of German submarine commanders culminating in the sinking of the *Lusitania*, which he said "the government of the United States has observed with growing concern, distress, and amazement."

Referring to the claim that the alleged illegal acts of her adversaries justified Germany in adopting retaliatory measures the American note stated that the government of the United States could not admit that any such measures were legal which infringed the clearly established rights of neutrals under international law. These rights include the protection of the lives of noncombatants traveling on unarmed merchant vessels and the right of neutrals to travel on the high seas wherever their legitimate business calls them. In view of these clearly established principles the note stated that "it confidently expects the Imperial German government will disavow the acts of which the government of the United States complains; that they will make reparation as far as reparation is possible for injuries which are without measure, and that they will take immediate steps to prevent the recurrence of anything so obviously subversive of the principles of warfare, for which the Imperial German government have in the past so wisely and so firmly contended." In conclusion it was stated that "the Imperial German government will not expect the government of the United States to omit any word or any act necessary to the performance of its sacred duty of maintaining the rights of the United States and its citizens and of safeguarding their free exercise and enjoyment."

Some hope was felt that the German government would disavow the act when on May 11, 1915, a note was issued explaining its attitude with respect to American and other neutral ships in the war zone. It stated that the German government had no intention of attacking such neutral ships if they were guilty of no hostile act. Even if such ships carried contra-

band they were to be dealt with according to the rules of international law applying to prize warfare. It further stated that if a neutral ship should be destroyed by mistake the German government would "unreservedly recognize its responsibility therefor." While this did not cover the question involved in the *Lusitania* case, viz., the right of neutrals to travel in safety on merchant vessels under a belligerent flag, nevertheless it was a distinct modification of the policy announced in the proclamation establishing the war zone.

On May 28, 1915, the German government submitted a note defining its position in regard to the various questions raised in the American note. With regard to the cases of the *Cushing* and the *Gulflight* it was stated that an investigation was in progress and the results of this investigation would be communicated to the United States government shortly. (A note was sent by the German government on June 4, 1915, expressing regrets for the sinking of the *Gulflight*, explaining that no distinctive marks were seen on the vessel by which she could be identified. Germany further agreed to furnish full recompense for the damage done. In regard to the *Cushing* the German government asked for additional information in the possession of the American government in order that a conclusion might be reached in the matter.) In regard to the *Falaba*, it was again stated that the commander had disregarded the order to lay to and had sent up rocket signals for help.

Concerning the *Lusitania*, the German government took the position that the government of the United States had not considered all of the material facts in the case. It then repeated the charge that the *Lusitania* had guns on board mounted under decks, that the British government had issued orders to merchantmen to ram submarines, and that in view of these alleged facts the German commanders "were no longer in a position to observe the rules of capture otherwise usual." It was further contended that the *Lusitania* carried large quantities of ammunition and a number of Canadian troops, and that the German government was justified in destroying war munitions destined for the enemy. Finally it was asserted that the rapid sinking of the *Lusitania* was due to an explosion of the cargo of ammunition. (It was categorically denied both by the British authorities and the American port officials at New York that the *Lusitania* carried guns and war munitions.) The German government requested the American government to carefully consider the above statements and express its view in regard to them when the German government agreed to make a final statement as to its position.

It was at this juncture in the negotiations that Mr. Bryan resigned as Secretary of State on the ground that he was unable to agree with the President as to the proper policy to pursue in dealing with the difficulties with Germany. The two points upon which Mr. Bryan in his letter of explanation stated that he was not in agreement with the President were (1) as to submitting the *Lusitania* case to the investigation of an international commission and (2) as to warning Americans against traveling on belligerent vessels or vessels carrying cargoes of ammunition. Mr. Bryan held that the questions in dispute should be considered by an international commission, and secondly, that American travelers should be warned as above indicated.

The next diplomatic move was made on June 9, 1915, when the American government replied to the German government that it noted with satisfaction the position taken by the latter in the cases of the *Cushing* and *Gulflight*. In regard to the *Palaba* the United States was unwilling to admit that the attempt on the part of the merchantman to escape capture altered the obligation of the commander of the attacking vessel to provide for the safety of the lives of those on board the merchantman. In regard to the statements made by Germany that the *Lusitania* was armed, the American government stated that it had official information that such was not the case. With regard to the carrying of contraband by the *Lusitania*, it was held that this was entirely irrelevant to the question of the legality of the methods used in sinking the vessel. Brushing aside these extraneous issues, the American government took its stand firmly on the ground that it was "contending for nothing less high and sacred than the rights of humanity," and it stated that it "very earnestly and very solemnly" renewed its representations made in the previous note.

A reply to this note came from the German government on July 8, 1915. There was in this communication little evidence of a desire to meet the issue. There were the usual assertions in regard to England's inhuman methods of warfare and a suggestion for guarding the safety of American vessels in the war zone. The rejoinder to this note sent by the government of the United States on July 21, 1915, indicated very clearly that it considered the German communication evasive and unsatisfactory. It stated once more in the clearest manner possible the real question at issue, namely, that acts of reprisal against an enemy are indefensible when they deprive neutrals of their acknowledged rights. The note further gave pointed evidence that the United States government felt that the discussion had gone far enough and that "it cannot believe that the Imperial government will longer refrain from disavowing the wanton act of its naval commander." Despite this urgent suggestion from the United States that the matter should be speedily settled the negotiations dragged on. There was evidence, however, that the German government was attempting to find some solution which would concede most that the United States was contending for while at the same time avoid the appearance of being humiliated. For example, on Sept. 1, 1915, Ambassador von Bernstorff (q.v.), in a letter to the new Secretary of State Lansing (q.v.), gave assurance that German submarines would not sink any more liners without warning. It is to be noted that this included ships belonging to belligerents as well as neutrals. Finally, in November, the German government authorized its Ambassador at Washington to begin negotiations looking to a settlement of all outstanding issues between the two nations.

While the negotiations in regard to the *Lusitania* were being conducted, further complications arose from the continued action of German submarines and commerce destroyers. The sinking of the American schooner *Wm. P. Frye* by the German auxiliary cruiser *Prinz Eitel Friedrich* led to an exchange of notes in which Germany finally agreed to pay an indemnity for the loss of the vessel and cargo, and also made the important stipulation that thereafter no merchant vessel would be sunk until the safety of

the crew and passengers was made absolutely certain.

In the case of the British steamship *Arabic*, sunk by a German submarine on Aug. 19, 1915, the German government at first refused to acknowledge any obligation in the matter, as it was contended that the *Arabic* had attempted to ram the submarine. Later, however, the German government agreed to pay an indemnity for the loss of American lives on the *Arabic* and further stated that the instructions to the commanders of submarines had been made so stringent that a repetition of incidents similar to the *Arabic* was considered out of the question. Just when it appeared that the issues between Germany and the United States which had arisen in connection with the operations of the submarines were about to be settled, a new issue appeared which seriously complicated the whole situation.

Question of Armed Merchantmen.—It had long been a recognized right under international law for merchant vessels to carry armament for defensive purposes. This practice dates back to the days of piracy and privateers, and the arming of a merchantman was intended for purposes of defense against these irregular enemies. It was never contemplated that such armament would be available against a regular man-of-war. The appearance of the submarine, however, changed the aspect of an armed merchantman. Even small-calibre guns would be effective for sinking these frail craft.

The German government contended that Great Britain had mounted guns on a large number of merchant vessels and had issued instructions to the masters of such vessels to attack submarines which approached their ships. Under these circumstances the German government contended that such vessels were in fact men-of-war and might be sunk without warning. There was much force in this argument, and the United States government in a communication to the belligerent Powers stated that, in view of the changed conditions of warfare and the disappearance of pirates and privateers, it was seriously considering regarding all armed merchantmen as vessels of war. It was suggested that the belligerents agree that submarines observe the rules of international law and at the same time that all armament should be removed from merchant vessels.

While this note was being considered by the belligerent Powers, matters were brought to a head when on Feb. 10, 1916, the governments of Germany and Austria-Hungary notified the United States that after March 1, 1916, armed belligerent merchant vessels would be sunk without warning by the Teutonic Powers. At about the same time it became known that the Entente Allies would not accept the compromise suggestions proposed by the United States.

This new development in the submarine issue aroused serious concern in the United States. There was a strong sentiment in Congress that the government should carry out its announced position of considering all armed merchantmen as vessels of war. The administration felt, however, that as the belligerent Powers had declined to accept its suggestion for disarming merchant vessels it was not within its right to insist upon this modification of international law. For a time it appeared as if a serious breach would occur between Congress and the Administration. Resolutions were introduced in both Houses of

Congress, calling upon the President to warn Americans not to travel on armed merchantmen. The President did not welcome this intervention of Congress in the conduct of negotiations with foreign Powers, and in order to place Congress on record, he asked for and received what in effect was a vote of confidence from Congress.

This new issue once more delayed the final settlement of the issues between Germany and the United States. The President refused to continue further the negotiations relative to the *Lusitania* case until Germany gave assurances that the submarine warfare would be conducted in such a way as not to imperil Americans traveling on the high seas. In a note presented to the State Department, Feb. 16, 1916, Germany recognized her liability in the *Lusitania* affair. She promised reparation and said that submarine operations (as reprisals) must only be directed against enemy subjects.

The sinking of the French cross-channel steamer *Sussex* aroused serious concern in the United States in view of the promises which had been made by Germany. In a communication sent to the American government on April 10, 1916, the German authorities offered an explanation of the sinking of several vessels, and denied responsibility for the sinking of the *Sussex*. President Wilson, in order to bring the whole issue to a final settlement, if possible, sent on April 19, 1916, a communication to Germany which was clearly in the nature of an ultimatum. It stated that an impartial investigation conclusively established the fact that the steamer *Sussex* was sunk without warning by a torpedo of German manufacture. It then reviewed the submarine activities for the preceding year and pointed out how submarine commanders had continued to sink merchant vessels, both belligerent and neutral, without warning, despite the explicit promises of the German government. In conclusion it was stated that unless the German government "immediately declare and effect an abandonment of its present methods of submarine warfare against passenger and freight-carrying vessels, the government of the United States can have no other choice but to sever diplomatic relations with the German Empire altogether."

On the same day that this note was sent, President Wilson, before the two Houses of Congress, read a message in which he reviewed the course of negotiations in connection with submarine warfare and informed Congress of the nature of the message which he had sent to Germany.

In reply to this note the German government stated that it was possible that the *Sussex* was sunk by a German submarine, and if further investigation should establish this to be the case "the German government will not fail to draw the consequence resulting therefrom." On the other hand the German authorities denied the assertion made in the American note that there had been an indiscriminate destruction of vessels by German submarines. They defended the activity of the submarines as a legitimate retaliation for the alleged violations of international law by Great Britain. However, it was stated that submarine commanders had received further instructions to the following effect. "In accordance with the general principles of visit and search and the destruction of merchant vessels recognized by international law, such vessels, both within and without the area declared

a naval war zone, shall not be sunk without warning and without saving human lives, unless the ship attempt to escape or offer resistance."

While this was a substantial agreement to the demand of the United States, the note went on to say that Germany would expect the United States government to "demand and insist that the British government shall forthwith observe the rules of international law universally recognized before the war," and in case the British government failed to do so "the German government would then be facing a new situation, in which it must reserve to itself the complete liberty of decision." This concluding statement held out the possibility of a renewal of submarine warfare without restrictions in case Great Britain did not modify her policy of blockade.

To this communication the United States government returned an immediate reply, stating that it would rely upon a "scrupulous execution" of the new policy by the German government. At the same time the note stated that the United States government could not agree that the continuance of this new policy of submarine warfare by Germany was "contingent upon the conduct of any other government affecting the rights of neutrals and noncombatants."

Shipment of War Munitions.—Shortly after the outbreak of the war large orders for war munitions were placed by the Entente Allies with American firms. The complete control of the seas by the British and French fleets made it impossible for the Teutonic Powers to obtain similar supplies. Comment in the German press indicated that the feeling in Germany was very strong that the United States was not observing a strict neutrality by allowing such shipments. On April 4, 1915, Ambassador Bernstorff called the matter to the attention of the United States government officially. He maintained that while the United States had taken no action in regard to alleged violations of international law by Great Britain in interfering with neutral trade, it had allowed American firms to supply large quantities of war munitions to Germany's enemies. He maintained that conditions in the present war were unique, that while theoretically arms might be shipped from the United States to Germany, practically they could be sent only to her enemies. A real spirit of neutrality called for the stoppage of a trade which was aiding only one side.

In a vigorous reply to this note President Wilson set forth clearly the position of the United States. He first called attention to the fact that her relations with England could not be made a subject of discussion with a third government. With regard to the shipment of arms and ammunition, the President pointed out that any change in the laws of neutrality during the progress of a war would be a departure from the principle of strict neutrality and the placing of an embargo on the trade in arms would constitute such a change.

In reply to a similar protest by the Austro-Hungarian government on Aug. 1, 1915, the government of the United States on Aug. 12, 1915, made an exhaustive statement of its position. It reiterated the statement made in the reply to Germany that any change in the rules of neutrality made during a war would violate the spirit of neutrality. In addition it pointed out that it had never been the policy of the United States to maintain a large military establishment or great stores of ammunition and had

depended upon the right to purchase arms and ammunition from neutral Powers in time of war. To prohibit such trade would compel every nation to have on hand sufficient munitions of war to meet any emergency, and would practically make every nation an armed camp.

Apart, then, from any question of the legality of an embargo on arms, the United States government felt that it would be a mistaken policy as it would deliberately encourage the spirit of militarism.

Relations with Austria-Hungary.—During the year 1915 two serious disputes arose involving the United States and Austria-Hungary. The first of these concerned the activities of the Austro-Hungarian Ambassador to the United States, Dr. Theodor Dumba.*

On Sept. 1, 1915, James F. J. Archibald, an American newspaper correspondent, was arrested by the British authorities, when the steamer *Rotterdam* put into Falmouth, for carrying dispatches from the German and Austrian embassies at Washington to Berlin and Vienna. Among the papers was a letter from Dr. Dumba, suggesting a plan for crippling the munition factories in America by fomenting strikes among the Austro-Hungarian laborers in these factories. Dr. Dumba admitted the authenticity of the documents and defended his action on the ground that it was his duty to bring to the attention of his fellow countrymen employed by the manufacturers of munitions that they were engaged in enterprises unfriendly to the fatherland, and that the Imperial government would regard them as guilty of a serious crime, punishable by penal servitude should they return to their own country.

This explanation proved unsatisfactory to the American government and Secretary Lansing notified the Austrian government that as Dr. Dumba had "conspired to cripple legitimate industries of the people of the United States and had flagrantly violated diplomatic propriety by employing an American citizen protected by an American passport as a secret bearer of official dispatches through the lines of the enemy of Austria-Hungary," he was no longer acceptable to the United States as the Ambassador from Austria-Hungary. In answer to this demand the Austro-Hungarian government agreed, on Sept. 27, 1915, to recall Dr. Dumba.

The second incident involving the two countries was the sinking of the Italian steamer *Ancona* on Nov. 7, 1915, by an Austrian submarine. The *Ancona* had attempted to escape but was overhauled. It was charged by the survivors that the submarine continued to fire after the *Ancona* had stopped. In all more than 200 lives were lost, among them nine American citizens. In a vigorous note the government of the United States, on Dec. 6, 1915, demanded that the Austro-Hungarian government should disavow the act, that the commander of the submarine should be punished, and that an indemnity should be paid for the loss of the lives of American citizens.

To this the Austro-Hungarian government replied on Dec. 15, 1915, asking for more specific information upon which the government of the United States based its charges. On Dec. 19,

1915, the American government replied, stating that it based its charges on the official report of the Austro-Hungarian Admiralty, and declined further to specify the additional testimony tending to corroborate the Admiralty's report. The incident was closed by the Austro-Hungarian government granting practically all of the American demands. In a note sent Dec. 29, 1915, it was stated that the submarine commander had been punished for not taking into consideration the panic aboard the *Ancona* which rendered disembarkment difficult. It agreed that Austria-Hungary should indemnify American citizens affected. While disclaiming responsibility for lives lost by the shots which were fired while the *Ancona* was attempting to escape, or for those lost by the faulty lowering of lifeboats, Austria agreed not to press for proof that the American lives were lost through the fault of the submarine commander, and agreed "to extend indemnities to those whose cause cannot be established." In conclusion the note stated that the Austro-Hungarian government "reserved to itself the right to bring up for discussion at a later time the difficult questions of international law connected with submarine warfare."

Public Opinion in the United States.—Public opinion in the United States was sharply divided as to the lessons to be drawn from the war, and as to the policy which that country should adopt. On the one hand a vigorous campaign was inaugurated to strengthen the military and naval defenses of the United States. It was urged with great earnestness that the war had demonstrated the futility of military unpreparedness and that the United States was in particular danger because of her great wealth which other nations would covet.

On the other hand it was urged with equal fervor that the cause of the war was primarily the great military armaments in Europe, and that the United States would make a great mistake by joining in the competition for military preparedness. It was pointed out by the advocates of peace that the energies of the country should be devoted to finding some means, if possible, to end the war, and to further the plans for preventing future struggles. Perhaps the most noteworthy, and certainly the most picturesque, of the efforts of the pacifists in the United States was the expedition organized by Henry Ford (q.v.), a millionaire automobile manufacturer, to go to Europe to discover some means of ending the war. A liner was chartered for the purpose. Included in the party of about 150 were a number of prominent American men and women, together with a considerable number of newspaper and magazine writers and moving-picture men. The United States authorities let it be known that the mission was in no sense officially sanctioned, while the European countries at war clearly indicated that the expedition was not welcome. Despite these discouragements the party sailed on Dec. 4, 1915. During the voyage serious discord developed among the members of the party. The expedition reached Christiansand, Norway, on Dec. 18, 1915. A few days later it was announced that Mr. Ford would have to leave the party and return to America because of illness. The remainder of the party went on to Copenhagen, and later to The Hague, where a number of meetings were held with delegates from other neutral countries. The expedition accomplished nothing of importance towards ending the war.

* Constantin Theodor Dumba, born (1856) in Vienna; graduated in law at the University of Vienna (1878) and then studied in Paris; entered Austrian Foreign Office (1879); Privy Councillor (1908); Ambassador from Austria to the United States from 1913 till his recall on demand of the United States government in 1915.

President Wilson, in order to get first-hand information concerning the condition of affairs in the belligerent countries, sent Edward M. House* abroad as his personal confidential agent. It is thought that the President was seeking to discover whether the time was opportune to offer mediation.

Scandinavian Countries. Immediately after the outbreak of the European War the three Scandinavian countries declared their neutrality and the governments of Norway and Sweden published identically worded explanatory communications which stated that the two governments had agreed to maintain their neutrality and had exchanged binding assurances with a view to preventing any situation arising which would precipitate hostilities between them.

In Sweden there was a strong Germanophile sentiment among the military class, which is in reality more a dislike of Russia than a love of Germany. This anti-Russian feeling is due mainly to the fear that Russia contemplates aggression against the Scandinavian peninsula. In Denmark and Norway the popular sentiment appeared to be favorable to Great Britain. The geographical position of these countries, especially of Denmark and Sweden, made it peculiarly difficult for them to maintain their announced position of neutrality. They controlled the entrance to the Baltic Sea and were so situated as to provide easy transit to both Russia and Germany.

On the initiative of the Swedish government a conference of the three Scandinavian monarchs was held at Malmö, Sweden, in December, 1914. It was called for the purpose of taking counsel together regarding means for limiting and counteracting the economic difficulties imposed on the three countries by the war. This conference was followed by the issuance of an identically worded protest to the nations at war against their measures which threatened neutral commerce.

The interference with Swedish trade, especially by Great Britain, led to the adoption of retaliatory measures on the part of Sweden. Embargoes were laid on wood pulp and other commodities needed by the Entente Allies. In order to reach a solution of the question of neutral trade Great Britain, in July, 1915, sent a commission to Sweden. Some months later it was stated that a satisfactory arrangement had been made.

A second conference of the premiers and foreign ministers of the three countries was held in March, 1916, at Copenhagen with the purpose of strengthening the understanding between them. It was reported that an agreement had been reached that if any one of the three nations should become involved in the war, the other two would not align themselves with the opposing belligerents. It was further decided that at the proper time steps should be taken by the three Powers in conjunction with other neutrals to protect the interests of neutrals generally.

Netherlands. The geographical situation of the Netherlands made its relations to the belligerents even more difficult to adjust than was the case in the Scandinavian countries. At the outbreak of the war there was considerable apprehension in Holland that their country might

suffer a fate similar to that of Belgium. The authorities, however, determined to defend the neutrality of Holland to the best of their ability, and with this end in view the Dutch army was mobilized and sent to the frontiers. These military measures, together with the expenditures made in caring for a large number of Belgian refugees who fled to Holland, entailed a considerable financial burden upon the country. In common with other neutral countries, Holland was seriously affected by the restrictions placed upon neutral commerce, especially by Great Britain. As Holland offered an easy means of communication with Germany, Great Britain deemed it necessary, in order to make her blockade of Germany effective, to adopt some measure to prevent neutral goods passing through Holland to Germany. With this end in view there was organized a company known as the Netherlands Overseas Trust, to which was to be consigned all imports which might be of use to Germany. This company agreed to dispose of these imports so that none should reach Germany.

Switzerland. The situation of Switzerland was unique. The little country was completely surrounded by the nations at war. The sympathies of the people were determined by their racial affiliations. There are three distinct racial groups in Switzerland, namely, German, French, and Italian, of which the German group is the largest. Despite these conflicting sympathies, the Swiss authorities were determined to maintain the neutrality of the country, and the army was mobilized in order to prevent any violation of this neutrality by the belligerent Powers. In dealing with the problem of imports into Switzerland, the Entente Allies followed much the same policy as had been adopted in Holland. There was organized a company called the *Société Suisse de Surveillance Économique*, through whose hands imports which might be of service to Germany were to pass.

South American Countries. All of the South American countries were seriously affected by the outbreak of the European War. A large amount of the business in these countries was carried on by European credit and the dislocation of the European financial markets seriously crippled the business interests in South America. Moreover, a large part of the export trade of these countries was cut off and emergency measures had to be adopted to relieve the situation. In Chile a moratorium was declared, and the President was empowered to extend government aid to the nitrate industry, the most important in the country. Argentina floated two loans, one of \$15,000,000 and the other of \$25,000,000, in the United States. This was the first time a South American country had negotiated a loan directly in the United States.

Chile became involved in a dispute with the belligerents when, on April 2, 1915, the German cruiser *Dresden*, which had entered Chilean waters and had been ordered interned, was sunk by a British squadron. Chile demanded an apology from Great Britain for this violation of her sovereignty and this demand was conceded. Germany sent a sharply worded note protesting against the acceptance of this apology, and Chile replied by demanding an apology from Germany for overstepping the bounds of international law in intervening in a question which involved Chile's relations with another Power. After some discussion the matter was adjusted peaceably.

* Edward Mandell House, born (1858) at Houston, Tex.; educated at Cornell University; active in Democratic politics in Texas and director of the campaigns of many successful Democratic nominees for Governor from 1892; himself never a candidate for office; confidential adviser of President Wilson from the time that Wilson was Governor of New Jersey.

Reception of the Barred Zone Note.—The issuance of the barred sea zone note on Jan. 31, 1917, created a profound impression in all the South American republics. None of them, however, seemed ready to take the step adopted by the United States government and sever diplomatic relations. Brazil replied in part "... The unexpected communication we have just received announcing a blockade of wide extent of countries with which Brazil is continually in economic relations by foreign and Brazilian shipping has produced a justified and profound impression through the imminent menace which it contains of the unjust sacrifice of lives, the destruction of property, and the wholesale disturbance of commercial transactions. . . . For these reasons the Brazilian government, in spite of its sincere and keen desire to avoid any disagreement with the nations at war, with whom it is on friendly terms, believes it to be its duty to protest against this blockade and consequently to leave entirely with the Imperial German government the responsibility for all acts which will involve Brazilian citizens, merchandise, or ships and which are proved to have been committed in disregard of the recognized principles of international law and the conventions signed by Brazil and Germany.

Chile refused outright to recognize the legality of the German attempt to establish barred zones and "consequently reserves liberty of action to protect all her rights in the event of any hostile acts against her ships." Argentine, Peru, Uruguay, Bolivia, Panama, and Cuba all took similar action. The keynote of their replies were that any act on the part of Germany against their rights as neutrals would be considered unfriendly.

Soon after the declaration of war between the United States and Germany, Brazil issued a proclamation of neutrality as between those two nations, although there was a strong party in the country which favored a declaration of war based on the grounds laid down by President Wilson of the United States. She kept this attitude of neutrality until June 4, 1917, when the Brazilian Ambassador handed to the State Department at Washington a note which read in part, "Brazil ever was and now is free from warlike ambitions, and, while it always refrained from showing any impartiality in the European conflict, it could no longer stand unconcerned when the struggle involved the United States, actuated by no interest whatever but solely for the sake of international judicial order, and when Germany included us and the other neutral powers in the most violent acts of war." Brazil seized about 150,000 tons of German merchant vessels in her harbors and ordered her fleet to cooperate in the patrol work in the southern Atlantic.

Brazil declared war on Germany on Oct. 26, 1917, and immediately took steps against her large German population. She annulled all contracts entered into for public works with Germans, forbade land cessions to Germans, took over the control of German banks, and interned all German subjects. Disorder immediately broke out in the large German settlements in southern Brazil, and an army had to be sent to restore order. Shortly after her declaration of war Secretary of State Lansing (United States) published two telegrams from Count Luxburg, the German Charge d'Affaires at Buenos Aires to Berlin through the Swedish legation, stating

that the situation in Brazil was serious, but that a visit of a submarine squadron would materially relieve the situation. Brazil had knowledge of these before she declared war.

By the end of 1917 the situation in Argentina was very acute. On Sept. 8, 1917, Secretary of State Lansing published telegrams that had been sent to Berlin in cipher through the intermediary of the Swedish foreign office. The first one under the date of May 19, 1917, states that in the future Germany had better adopt one of two policies with regard to Argentine ships. They must either let them alone or sink them without leaving a trace of their sinking (spurslos versenkt). In a telegram dated July 9, he reiterated the same sentiments. The publication of these created a profound impression of the country. Mobs gathered in the streets of the capital, German houses were wrecked and burned. Troops had to be called out to quell the riots. Count Luxburg was handed his passports and the Argentine Senate passed a resolution asking for the breaking off of relations with Germany. President Irigoyen refused to sanction the resolution even after it had been passed by both houses. He announced that Argentina would maintain her neutrality as long as Germany lived up to the pledge given in October, 1917, "to recognize the Argentine flag and respect the nation and people." The country was almost in a state of civil war over the question of whether the country should go to war or not. A big strike on the railroads helped to mix up matters further and to put the state in a serious plight.

Costa Rica severed diplomatic relations with Germany on Sept. 21, 1917. On October 6 the Peruvian government handed his passports to the German minister. On October 10, the government announced that the harbors of Peru were opened to the warships of the Allies. On October 8, Ecuador announced that the minister from Peru who was also minister to Ecuador would not be received in that country. In December, 1917, she broke off diplomatic relations with Germany entirely. Uruguay broke off relations with Germany on October 7. The President in his address to the Parliament stated that Uruguay had not received any harsh treatment at the hands of Germany but that the country should join hands with those fighting for justice and democracy. She seized almost 50,000 tons of German shipping in her harbors. Paraguay had also broken off relations with Germany soon after the publication of the "barred sea" note.

In December, 1917, the State Department at Washington published several more telegrams sent to Berlin by way of the Swedish legation. The purport of most of them was to unify the German population of South America, which was very great and organize them against the South American republics. They spoke very sneeringly of the people of South America, referring to them one time as Indians with a slight veneer over them.

South American countries that broke relations with Germany by January, 1918, were Bolivia, Brazil (declared war), Ecuador, Paraguay, and Uruguay. Central American countries that had broken relations were Costa Rica, Honduras, Guatemala, and Nicaragua. Panama and Cuba declared war on Germany on April 7, 1917, the day after the United States declared war. Haiti broke off relations in June.

IX. RELIEF MEASURES

The outbreak of the European War very soon made it evident that millions of innocent victims in the fighting areas would be without independent means of support on account of wholesale destruction of property, the confiscation of food supplies, and the paralysis of industry. This was first illustrated in Belgium, where it was estimated that by November, 1914, over 6,000,000 people had been rendered homeless and 1,500,000 destitute. The prosecution of the war, however, resulted in the creation of a similar situation in Russian Poland, Galicia, and in Serbia. The situation in Poland was even worse than that in Belgium. Finally the unprecedented butchery of the Armenians by the Turks rendered relief for the remnant of the Armenian population an absolute necessity.

As early as September, 1914, relief organizations began to be formed in the United States. After considerable duplication at first, relief committees gradually were systematized under central committees. All sorts of devices were resorted to, including appeals through newspapers, endless-chain whist parties, fairs and bazars, theatrical and musical performances, "tag" days, balls and fêtes of various kinds, and appeals through churches and other organizations.

Commission for Relief in Belgium. This was the most extensive relief organization, embracing all neutral countries. It was brought into existence through the activities of the American and Spanish ambassadors at London and ministers at Brussels, the American Ambassador at Berlin and the American Minister at The Hague. There were national organizations in America, Spain, Italy, and England, besides a most extensive distributory organization in Belgium and northern France. It carried out the distribution of its aid in Belgium through the Comité National de Secours et d'Alimentation. Similarly on account of the devastation in the occupied French territory the Comité d'Alimentation du Nord de France was organized. The commission had assembling depots in every State in the United States, and representative executives in all but about 12 States.

The committee secured pledges from England, Holland, and Germany, permitting the transportation of food products to the occupied territory and the pledge of Germany that such food would not be confiscated for war purposes. The general policy of the commission was to cooperate with organizations of every sort in Belgium and northern France; local committees were brought into existence in almost every commune of the occupied territory, and over these were district and provincial committees, all under the Comité National. The work was carried out under three main divisions: the Provisioning Department; the Financial Relief and Exchange Department; and the Benevolent Department. The Provisioning Department provided food for about 7,000,000 people in Belgium and 2,300,000 in northern France. Foodstuffs were sold to the population and the profits thus secured were used by the Benevolent Department for the care of the destitute. Food was given out through a system of canteens covering all Belgium, meals being supplied at a per capita cost of only eight cents a day. There were also baby canteens, cheap restaurants, meals for school chil-

dren, and in some cases provision of shelter. Aid was also given to or through the following: a committee to aid doctors and pharmacists by supplying medicines, serums and other necessities; child institutions working for the better feeding of infants, the aid of private and public orphanages, and assistance to war orphans and other homeless children; the treatment of indigent consumptives; an agricultural committee to control the supply of seeds and fodder; a committee for the aid and protection of artists, some 50,000 lace workers (mostly Belgian women), destitute foreigners, and refugees from other localities; a committee for the rehabilitation of churches; local workrooms for the repair of clothing for the destitute; and miscellaneous grants for Cardinal Mercier for trade training for maimed soldiers, and for maternity hospitals.

The total amount of money entrusted to the commission up to April 1, 1917, was \$250,000,000, which, with the exception of overhead charges, were spent for food in Belgium and France. The British and French governments contributed \$108,121,358 for relief in Belgium. After the diplomatic break between the United States and Germany the Dutch took over the work of the Commission.

Belgium Relief Fund. This fund "for women, children and other noncombatants" had its headquarters in New York City. It embraced numerous local committees, including one in every State. Most of the cash received was spent for food, but small sums were sent to refugees in Holland and to war victims in the unoccupied parts of Belgium.

Jewish Relief. On account of the great number of Jews in Poland and other parts of Europe who suffered extreme privation as a result of the war, the American Jewish Relief Committee for Sufferers from the War was organized in New York City. Towards the close of the year 1915, a most active campaign for funds was undertaken. Local committees were formed in cities throughout the country. In 1916 a great bazar was held in New York City which realized about \$1,000,000.

In Great Britain was formed the Russian Jews' Relief Fund for the aid of Jews in Russia and Poland. It had branches in all the principal cities. By means of it over 120 relief centres were feeding every day more than 200,000 homeless and destitute Jews.

In Russia a central relief committee at Petrograd sent out word that military authorities had forcibly removed 250,000 Jews from their homes in the occupied territory and that 200,000 more had left voluntarily. The committee had opened employment agencies in 31 cities and equipped 10 workshops. Hospitals, asylums, infirmaries, and schools were opened.

Other Funds. There were a considerable number of other agencies in America collecting money and supplies for the relief of special classes of victims. Among these were the American Ambulance Fund, the Duryea War Relief Fund, the American Girls' Aid, the Fund for the Relief of Women and Children in France, the Vacation War Relief Committee, the Cardinal Mercier Fund, the National Allied Relief Committee, the Servian Relief Fund, the National Committee for Syrian and Armenian Relief, the Polish Victims' Relief Fund, the American Polish Relief Commission, and the British-American War Relief Fund.

Red Cross. This society was put to the se-

verest test it ever had to undergo. In all the belligerent countries, the work of the relief committees was supplemented by the efficient service rendered by the Red Cross Society. The American National Red Cross Society rendered greater continuous service than was ever given by any Red Cross of a neutral country during a foreign war. At the outbreak of the war this society had an enrollment of about 6000 nurses and surgeons. It sent over a number of surgical and sanitary units (a unit is a working force of 3 surgeons and 12 nurses sent to a hospital, together with the necessary supplies) for hospital work and the relief of noncombatants. An enormous quantity of purchased and donated medical, surgical, and hospital supplies, bed linen, garments, etc., were shipped from the United States to practically all the battle fronts by the American Red Cross. In Serbia and Montenegro the American Red Cross, in conjunction with the Rockefeller Foundation, suppressed the epidemic of typhus fever which destroyed 150,000 lives.

X. FINANCIAL AND ECONOMIC ASPECTS

In ancient times wars involved the entire male population and frequently the women as well in the actual fighting and campaigning, but modern wars affect the vast majority of the population, even of belligerent nations, only through their economic relations. The development of the vast mechanism called into operation by war to-day has however required such immense financial transactions and such gigantic demands upon industrial resources that these indirect effects in the European War were felt not merely by every family in the fighting areas but indeed by every family in the civilized world. The first immediate financial effect of the outbreak of war is a disturbance of the machinery of international credit. Foreign investments frequently aid during peace in restoring the balance of trade, but in this war investment movements were exactly reversed. Thus normally the great excess of United States exports of merchandise over imports is offset in large part by foreign investments in American securities. But the war brought a sharp reversal of this process, the New York Stock Exchange being deluged with orders from abroad to sell at any price. The outbreak of hostilities creates a desire to delay payment of obligations owed but to insist on immediate payment of those due. Trade temporarily comes to a standstill and gold shipments become dangerous and are impeded by great advances in insurance rates and by the reluctance of its holders to part with it. Moreover so paralyzing was the effect of the war at the moment it began that a temporary cessation of international exchange must have been inevitable. The greatest force of these conditions was naturally felt at London, the world centre. Consequently we find there the government taking most extraordinary measures to restore the movement of exchange. In war as in times of financial crisis each nation seeks to increase its gold holdings. This can be done only by increasing exports, decreasing imports, selling foreign investments, or contracting obligations abroad. Now it is not possible for belligerent nations to increase their exports because of the disturbance of their own production, the drafting of workers into the armies, the increased demand for goods due to the war, and, in the

case of nations hostile to England, the control of the high seas by the British fleet. On the other hand all fighting nations experience a greatly increased demand for goods, especially for food and all kinds of military supplies. This may be in part offset, and vigorous efforts were made in all countries and notably in England, France, and Germany to offset this in part, by cutting down the consumption of articles classed as luxuries. The great reduction of trade to and from the Central Powers made their foreign exchange problem relatively simple, though the rates of exchange ran heavily against them. The Allies on the other hand began the war with rates of exchange in their favor, mainly owing to the enormous obligations of the United States. This situation, however, was within a few months exactly reversed owing to the extensive purchases of the Allies and the great volume of American securities sold by them. So unfavorable became the rate and so necessary were American goods that international loans of unprecedented size were effected to enable the Allied Powers to continue their purchases in the American market.

Closely involved with the problem of international exchange are the banking institutions and their rates of interest. In addition, however, the banks must meet great internal problems connected with currency, the flotation of government loans, and the special problems arising from the unique conditions in internal trade. Currency systems are deeply affected though less markedly than formerly when their basis was less firmly established. Nevertheless the shock of war was everywhere so pronounced in its effect upon instruments of credit that every belligerent nation and the United States were compelled to issue additions to their outstanding currency. The interruption of foreign trade and the consequent dislocation of business are reflected in the movement of the stock markets. Almost upon the instant that hostilities began the world's stock exchanges were paralyzed. The Bourses at Toronto and Madrid closed July 28; those at Vienna, Budapest, Brussels, Antwerp, Berlin, and Rome on July 29; and those at Paris, St. Petersburg (Petrograd), Montreal, and all South American centres on July 30. This threw the burden of the world's stock market operations on the London and New York exchanges. The former of these closed on July 31 for the first time in its history. The governors of the New York Exchange thus faced a crucial situation. A panicky state of mind prevailed; brokers were deluged with orders, especially from abroad, to "sell at the market"; it was evident that to remain open meant complete demoralization. Consequently this exchange also was closed on July 31, shortly after that at London.

The gradual readjustment of industries to the new war basis is another fundamental aspect of its effects. Never before was concerted action in industrial life so supremely important for the outcome of a trial at arms. The war brought about an actual mobilization of industries for war purposes in every belligerent country. Moreover the productive efforts of neutrals, not merely in munitions manufacture, but in many lines, were tremendously stimulated. The productive power of the entire world was raised almost to its highest pitch in the vast attempt at mutual destruction by the belligerents. Never were goods produced so abundantly and

never was capital destroyed so rapidly or the world hastened towards pauperization at such a pace. The nearly complete cessation of exports from the Central Powers involved a violent readjustment in many industries previously engaged in producing for foreign markets. Among the Allies such industries were less disturbed, while in the United States and other neutral countries there were numerous transformations due not merely to the development of munitions factories, but to the manufacture of all kinds of military supplies, and the development of industries for supplying articles previously imported from Germany and Austria as well as supplying the similar needs of other neutrals. Finally the outbreak of the war was speedily followed in every nation by the adoption of special financial measures for supplying the needed public funds and the longer the war continued the more vital became the extent, variety, and basis of the various war loans. The foregoing—exchange, banking, currency, stock market, war loans, and the readjustments of industry—constitute the principal features of the effects of war on finance and trade.

International Exchange and Banking Problems. The financial problems confronting the bankers and traders of Great Britain were of the most momentous importance for the trade and commerce of the world. The priority of England in the development of international trade had long since made London both the financial and commercial centre of the world. In consequence an important part of London financial institutions had been devoted to settling accounts between debtors and creditors in all parts of the world. Here are included the accepting houses, bill brokers and discounters, and the banks. The immense volume of this business is realized when it is known that at any one time there were before the war about \$1,600,000,000 of trade and finance bills for which the accepting houses and banks were liable, many millions falling due daily. The entire system of handling international exchanges collapsed early in August and it was not until about mid-September that regular quotations of rates of exchange again appeared in London. Accepting houses and joint-stock banks faced ruin because clients for whom acceptances had been made failed to remit; but these clients themselves were confronted with canceled orders, cessation of trade, stoppage of the supply of goods, impossibility of remitting, and similar contingencies. The discounters and bill brokers found themselves with large quantities of discounted bills on hand for which they could not be reimbursed and at the same time their banks were calling for a return of loans. Even the banks themselves were directly involved through the possession of bills which they had discounted. Moreover their loans to bill brokers were counted as quick assets and the embarrassment of the brokers necessarily weakened the banks. To check demands upon its resources the Bank of England raised its rate to 10 per cent. See **PANIC, FINANCIAL.**

Before this situation became unmanageable the government on August 2, two days before its own declaration of war, declared a moratorium on bills of exchange to last one month. This checked the tendency to panic by giving a breathing spell during which methods and means of handling the problem were formulated.

Nine days later a Treasury statement an-

nounced that the Bank of England would rediscount on certain terms any "approved bill" before it became due; and that acceptors of bills would be given time in which to make payment but would be required to pay 2 per cent above bank rate for the privilege of extension. The government suggested that the bank be prepared to approve all bills customarily discounted, "and also good trade bills, and the acceptances of such foreign and colonial firms and bank agencies as are established in Great Britain," with the understanding that the government would guarantee the bank against loss. On September 5 another Treasury statement announced that, owing to the choking of the exchange mechanism by promissory bills, acceptors would be lent funds for paying such bills as they came due, and that any unpaid balance of such loans would not be pressed "for a period of one year after the close of the war." Thus both old and new acceptances seemed amply protected. A further difficulty was met in foreign indebtedness. On November 3 was promulgated a plan to investigate solvent traders and advance them funds up to 50 per cent of the foreign debts due them. Thus every obstacle to the resumption of exchange business was removed. On the Continent similar, but less stupendous, problems were to be met. Moratoria were declared in every belligerent country except Germany, and in some neutral countries for reasons similar to the foregoing. Germany avoided a moratorium mainly because of her isolation and partly by the stoppage of collections on bills owed abroad. In both France and Germany, as in England, the central banks were permitted to greatly enlarge their note circulations and thus expanded to unprecedented figures their rediscounts for other banks. See **MORATORIUM; PANIC, FINANCIAL; REDISCOUNTING.**

The most serious aspect of the American financial situation and the fundamental cause of most difficulties was the stupendous debt owing to Europe upon the outbreak of war. Although this country had normally a trade balance of about one-half billion dollars annually, nevertheless its indebtedness for interest and dividends, for tourists' expenditures, for freight, and other items, changed the great trade surplus into a net debt. Sir George Paish, an international authority who was sent to the United States in October, 1914, by English bankers to expedite the payment of these obligations, estimated their total at \$600,000,000. This included more than \$100,000,000 of short-term loans which ordinarily could have been easily renewed or met by fall exports. Abroad refuge had been taken behind moratoria; and the great central banks of Europe served to pool resources and control operations, while in the United States the new Federal Reserve System was not yet in working order. Although \$45,000,000 in gold was sent to Europe during the last few days of July and the first week of August, sight exchange on London at New York, normally \$4.80 per pound sterling, rose to \$5, then to \$6, and finally to \$7, a height never before approached, and regular exchange was not quoted until September 11. A special factor in aggravating the banking difficulties at New York was the maturing early in the fall of about \$82,000,000 of New York City warrants held in London and Paris. To meet these and to strengthen the city's credit there was provided a loan of \$100,000,000 in gold to

which every bank and trust company in the city but one contributed. At the same time bankers of the country created a "Gold Pool" of over \$100,000,000 to meet urgent mercantile obligations abroad, and to provide gold needed for export. It was composed of contributions from banks in reserve cities in proportion to their gold holdings. It served as a guarantee against the complete collapse of American credit abroad and removed from the banks the necessity of seeking refuge behind an unofficial moratorium. Portions of this fund were shipped to the branch of the Bank of England established at Ottawa, Canada, to serve as a basis for exchange on London. The sharp rebound of trade towards the close of the year, the entrance of the world into the American market for goods and loans made possible the dissolution of the "Gold Pool" in January, 1915.

The exchange situation was made particularly difficult by the great reduction of the export trade, especially the exportation of cotton. Moreover the prosperity of the South was seriously threatened unless some means could be devised whereby cotton could serve as a basis for additional credit. Congress and Secretary McAdoo authorized banks to issue emergency currency on the basis of cotton warehouse certificates. About the same time a plan for a Cotton Loan Pool was devised whereby pledges to supply funds to be loaned through Southern banks to cotton growers were deposited with members of the Federal Reserve Board as individuals. By the middle of November more than \$100,000,000 was thus subscribed. However the considerable revival of the export trade in cotton towards the close of 1914 together with the great improvement of internal trade, and the bracing effect of the establishment of the Federal Reserve System made the cotton pool well-nigh unnecessary. It became inoperative in January, 1915, only \$28,000 having been applied for.

The rates of international exchange reflect the conditions both of trade and of credit. At New York the rate on London was not regularly quoted until September 11, when the cable transfer rate stood at \$4.95, par of exchange being \$4.86. It became still more unfavorable, reaching \$4.975 in the weeks of October 8 and 15. It thereafter fell steadily, reaching par on December 22. It continued to fall until early September, 1915, when it reached \$4.63. It was partially restored by the Anglo-French loan, but only for a brief period. In December the British government began to borrow or purchase American and Canadian securities owned by English citizens with a view to their use as security for loans to be advanced by American bankers as a means of preventing further declines in the rate of exchange. About the same time the importation of certain luxuries was prohibited for a like reason.

At Paris the rate of exchange was slightly unfavorable to London during the first half of October, no rates being quoted during August and September; it gradually declined until November 26 and thereafter rose continuously, reaching par again Feb. 19, 1915. It thereafter continued to become slightly more unfavorable to Paris with every passing week. In May, 1916, Finance Minister Ribot began the collection of American, Swiss, Dutch, Scandinavian, and South American securities to be used as a basis for credits for equalizing exchange with the

United States. At the same time the government announced a long list of articles the importation of which was prohibited partly to affect exchange rates.

Almost from the beginning of the war rates of exchange were unfavorable to Berlin. The slight volume of foreign trade and the adjustment of outstanding accounts early brought the rates to considerable stability. Nevertheless the continued purchases in neighboring neutral countries and the steady inflation of German currency brought about a decline of German credit in the later months of 1915. Thus the exchange rate at New York had been only 14 per cent unfavorable until November, 1915, when it dropped rapidly to 26 per cent unfavorable. Similar rapid declines brought about rates unfavorable by 38 per cent at Amsterdam, and by 28 per cent at Zurich.

As stated above the New York Stock Exchange was forced to close very quickly after the closing of the London Exchange. This naturally disturbed the banking situation since considerable loans were based on stock as collateral. Such collateral is generally most fluid of all, but with its market closed it became quite solidified. The banks, however, gradually readjusted affairs without forcing repayment of loans or otherwise unduly disturbing a delicate situation. The reopening of the Exchange was delayed in part to prevent the resumption of the pressure of European sellers and the consequent increase of foreign obligations. The Exchange declared the level of prices on July 30 the official minimum, and on this basis some transactions were carried through under the direction of a Committee of Five. In this manner more than \$100,000,000 of bonds and 250,000 shares of stock were transferred by the end of November. In Philadelphia public auction sales of stocks and bonds were held at various times, prices ranging not far below those of July 30. Gradually at New York the scope of exchange business was enlarged; transactions in a restricted list of bonds were begun on November 28; and two weeks later trading in 181 specified stocks with definitely established minimum prices was begun. The total dealings, however, on the New York Exchange aggregated only 47,899,000 shares for the year 1914, slightly more than one-third those of 1912.

With the opening of 1915, however, pessimism gradually disappeared under the revival of business and was replaced by waves of speculative fever in the stock market. This was notably true in April when 21,000,000 shares were transferred, and in August, September, and October, 26,000,000 shares being transferred in the latter month. The shares of the munitions companies were popularly known as "war brides." Many of these stocks made most phenomenal advances in price during the year. Less speculative interest was shown in the stocks of numerous companies manufacturing supplies the demand for which had been greatly stimulated by the conditions of war. Moreover the great increase in the volume of railway traffic, which towards the close of 1915 amounted to an unprecedented congestion of freight and the refusal of numerous roads with terminals on the Atlantic seaboard to receive additional goods for export during certain periods, resulted in advances in railway stocks. This revival of business did not occur soon enough to prevent a very large amount of railway mileage from

going into the hands of receivers, but railway stocks in general showed advances of 10 to 20 points. In the year 1915 fewer miles of new railways were built than in any year since 1864; in October, 1915, more miles were in receiverships than ever before; and yet in the early months of 1916 earnings were never larger.

The bond market likewise reflected the great abundance of capital seeking investment. While advances in bond prices were not remarkable, there was a general upward movement ranging from 1 to 6 per cent during 1915. Moreover the easy money market resulted in the ready flotation of an unusual amount of public and corporation bonds. In consequence of these conditions the total number of stock shares exchanged in 1915 was greater than in any preceding year since 1909.

In addition to the foregoing the American market absorbed an astonishing volume of securities previously held by foreign investors. At the opening of the war the par value of American corporation securities owned abroad was variously estimated at from \$4,000,000,000 to \$6,000,000,000. The most authoritative estimate showed that \$620,000,000 of these securities were repurchased during the first five months of 1915; the estimate for the entire year was that not less than \$1,000,000,000 of such stocks and bonds were transferred to American investors.

Currency. Every country in war time experiences an irresistible demand for increases in credit instruments. Not only do governments issue treasury notes but banks are certain, as in times of panic, to increase their note issues. In England there was much discussion of a proposed "suspension of the Bank Act," meaning a proposal to permit the Bank of England to expand its note circulation without increasing its reserves. The steps devised for reestablishing foreign exchange obviated this measure, though Bank of England circulation was expanded and a large volume of £1 and 5s treasury notes were issued. A law of August 7 made not merely these treasury notes legal tender but also postal money orders. Provision was also made for the issue of certificates, like clearing-house certificates, for the settlement of bank balances. Finally the currency and Bank Notes Act authorized the Bank of England to issue to depositary banks notes up to 20 per cent of their deposits and current balances. (See PANIC, FINANCIAL.) In May, 1916, the bank held \$140,000,000 in gold against over \$500,000,000 of paper. The bank, however, owing to its command of the entire gold production of South Africa amounting to about \$200,000,000 per year, was enabled to make extensive gold shipments to the United States and at the same time maintain its credit unimpaired. In France the government authorized practically unlimited issues by the Bank of France and various promises of the government were issued. (See below, *Cost of the War*.) It was estimated that whereas the actual inflation in England amounted to about 144 per cent by December, 1915, it was 157 per cent in France. In Germany, as explained below, the *Darlehnskassen* and the *Kriegskreditbanken* notes were based on property of various kinds. These tended to drive gold and silver out of circulation so that the government authorized the Reichsbank to issue its own notes in exchange for them. At the same time, however, the bank was instructed

to refuse to pay out gold for its own notes, but a vigorous effort was made to increase the bank's gold reserves. This reserve was thus increased from about \$300,000,000 in July, 1914, to \$610,000,000 in January, 1916. But the notes for which the bank was responsible had increased from \$475,000,000 to \$1,560,000,000. Austria and Hungary likewise went speedily to a paper basis.

The breaking down of the mechanism of international credit seemed certain to produce a panic in American banking circles. The American banking system was individualistic and proverbially weak under strained credit. It failed to supply additions to the currency at times when most needed. The Federal Reserve System was particularly designed to remedy this weakness, but in August, 1914, this system had not been finally established. After a conference of bankers and the Secretary of the Treasury at New York on August 2 it was decided to issue emergency currency under the Aldrich-Vreeland Act as modified by the Federal Reserve Act of 1913, and to issue in addition clearing-house certificates. Congress responded to the situation by hurriedly enacting a law reducing the tax on emergency notes for the first three months to 3 per cent and increasing their limit to 125 per cent of capital and surplus. Moreover State banks affiliated with the reserve system were authorized to take out notes; and cotton and tobacco warehouse receipts were made a legal basis for note issues. In consequence more than \$250,000,000 of emergency currency had been issued by September 1; a total of \$384,500,000 of such notes was issued by December 1. Very little publicity was given to the issue of clearing-house certificates in principal banking centres of the country, but \$250,000,000 of them were issued. Practically all of the emergency currency and the clearing-house certificates were retired by the end of January, 1915. Meanwhile the banking and credit situation had been materially strengthened indirectly by the revival of trade and directly by the final establishment of the Federal Reserve System, which was in full working order by Nov. 20, 1914.

Employment and Wages. In every nation the opening of hostilities brought on a temporary paralysis of trade, making the problem of unemployment acute in every belligerent country. Special committees, national and local, and special relief funds were created to meet the situation. The gradual readjustment of industry to a war basis and the recruiting of vast armies, however, very soon solved the problem. In Great Britain the labor problem was greatly complicated by the requirements of international trade. There were not merely the demands of the army and navy for equipment and munitions, but the immense difficulty of paying for greatly increased imports from countries to which exports were reduced. This difficulty was greatly increased by the requirement that Great Britain aid in financing her allies and colonies. Consequently the raising of an army at home was directly counter to her financial and commercial demands. The general effect of war on labor was stated by Gladstone to be an immense stimulus during war with enlarged employment and rise in wages, but excessive labor competition, severe unemployment, and reductions in wages when war is over. The truth of the first part of this statement

was made manifest in 1914. Very shortly in every country there was less unemployment than in times of peace, labor shortage actually became acute, wages advanced, and great numbers of women were drawn into unwonted industrial pursuits.

At the outset Great Britain was more unfavorably situated with regard to the manufacture of munitions of war than France, Germany, or Austria. Except for a few scattered private firms, a few small governmental establishments working for both army and navy, and the Woolwich Arsenal employing about 10,000 men, she had no munitions factories operating in July, 1914. Nevertheless 18 months later the entire country was dotted with such factories, their creation being one of the striking phenomena of the war. The astounding demands early aroused the existing arm makers to the highest pitch of activity, but it early became evident that the output of existing plants would be inadequate. By February, 1915, it became manifest that heroic measures must be adopted to secure an adequate output. Out of the delays and confusion resulted a ministerial crisis in May, 1915, which led to the formation of the Ministry of Munitions with Mr. Lloyd-George as its head. This sought to develop the latent capacities of manufactures in engineering and mechanical trades. The entire country was divided into eight munitions districts, besides two in Scotland and two in Ireland, with committees in principal towns. In March the Defense of the Realm Act had authorized the government to commandeer any factory for war purposes. Under this Act many old plants had already been transformed and new ones built, equipped, and manned. The Ministry of Munitions was needed, however, to bring order out of existing chaos by centralizing responsibility and control. It systematically investigated and listed every available factory and private resource. By the close of 1915 there were in addition 33 national shell factories employing from 300 to 1000 persons each, which had been created at government expense by adapting existing establishments. At the same time a number of national projectile factories were being completed to manufacture ammunition for a new type of heavy gun. Gradually the staff of the munitions office, including over 3000 persons divided among numerous departments, was brought to a high state of efficiency. From the first a source of great embarrassment was the inadequacy of skilled labor and its attitude towards the training and employment of unskilled workers. This problem was intensified by the enormous enlargement of the munitions industry, and was not alleviated by extensive advertisement for machinists in the United States. It was estimated that early in 1916 this business alone employed not less than 1,000,000 workers. Among these were included about 300,000 women who were found in England, as in France and Germany, to be capable of performing practically every kind of labor required in munitions making. The organized skilled workers objected to the "dilution" of the shops by unskilled and semiskilled workers, and resorted to strikes and other interruptions. Acts of Parliament very considerably reduced the privileges of labor to leave work and to transfer at will, but special boards for adjusting demands were created and elaborate rules were established to protect the health of the workers, especially of women and children.

Statistical measures of the amount of unemployment were not wanting. The *Labor Gazette* gave the percentage of trade-union members unemployed in June, 1914, as 2.4; it rose to 7.3 in August, and declined steadily thereafter to 2.5 in December, 1914, and to 0.5 in February, 1916. Wages showed little advance before January, 1915, but in February moved sharply upward in engineering, shipbuilding, railway service, docking, and carting, and thereafter the advance spread to all lines. The dearth of skilled labor resulted in many labor tangles, but the government and trade-union officials succeeded in maintaining an unusual degree of industrial peace. The number of trade disputes in 1914 was 999, involving 448,529 workers and a loss of 10,111,337 days of work; while in 1915 they numbered only 674, involving 445,936 workers and a loss of only 2,929,700 days of work.

The French Ministry of Labor reported that in August, 1914, only 48 per cent of establishments and 58 per cent of workers were employed. There was, however, a continuous improvement. By October, 1915, 81 per cent of establishments and 98 per cent of workers were employed. In metal manufactures and transportation new workers had been employed in numbers nearly sufficient to offset those with the colors; and this was partially true of food and chemical industries. But in printing, wood-working, building, glass and pottery making, and precious metals the numbers employed at the later date were less than half the peace normal. As in England women were drawn in great numbers, not only into munitions manufacture, but into many lines of industry, agriculture, and transportation.

In Germany the general course of events was very similar to that in England and France. The general dislocation of industry at the outbreak of the war brought into operation concerted action not merely to relieve unemployment but to shift industry to a war basis. The amount of unemployment among trade unions was 22.4 per cent at the end of August, 1914. It dropped to 15.7 per cent by the end of September, and continued steadily downward to 7.2 per cent at the end of December. This, however, was sufficiently above normal to require a special appropriation of \$125,000 per month by the city of Berlin to relieve unemployment during the winter of 1914-15. By May, 1915, trade-union members unemployed numbered only 2.9 per cent; by September, only 2.5 per cent, at which percentage it remained until February, 1916. As in other countries all trades engaged directly or indirectly in the production of military supplies were unusually prosperous, were employing unusual numbers of workers, and paying higher wages than before the war. But among hat makers, printers, lithographers, bookbinders, wood workers, and porcelain workers the percentage of unemployment was considerably higher than normal. The employment of women was very extensive; their number in unaccustomed pursuits reached 500,000 by July, 1915; they were found in nearly every branch of industry.

The effect of the war upon American industrial conditions was most remarkable. The impetus of the new demands set up by the war began to be felt before the close of 1914. Early in 1915 feverish activity began in various branches of the iron and steel industry, in the

production of copper, lead, spelter, and other metals, and in all branches of munitions manufacture. From these industries the impetus gradually spread to all allied industries and to those engaged in manufacturing such articles as automobiles, railway supplies, boots and shoes, blankets and woolen goods, and food products. While in the fall of 1914 unemployment had been extensive, this problem gradually disappeared, with the result that by the middle of 1915 there was an actual scarcity of labor in many lines, especially skilled labor, and wages had begun to advance. Consequently by the fall of 1915 the tremendous stimulus to American industry had reached all branches of the retail trade. Estimates of war orders placed in the United States during 1915 varied widely, ranging all the way from \$1,000,000,000 to \$2,000,000,000. During the early months of 1915 the Allies were victimized extensively by smooth, self-constituted, and often irresponsible agents of manufacturers, and by other speculating intermediaries seeking fortunes in commissions on war orders. Occasionally the Allies were defrauded by the manufacturers themselves. In all of this immense war business there was a feverish haste and a recklessness in expenditure that involved much waste. This was reduced, however, by the development by the Allies of regular channels for placing orders and by an elaborate and extremely thorough system of inspection of products.

American Foreign Trade. Not only did the Allies resort to the United States for unprecedented quantities of goods of numerous kinds, but Secretary of Commerce Redfield pointed out in his annual report for 1915 that the demands of Canada, Central and South America, India, the Near East, South Africa, and indeed every part of the world for American goods had increased. The impetus of this world-wide demand was scarcely felt during 1914. Consequently the exports in that year differed very little from those of the preceding years, being slightly less than in 1912 or 1913. For the calendar year 1915, however, the exports reached the remarkable figure of \$3,547,480,372. This was an excess over imports of \$1,768,883,677, an excess more than two and one-half times that of the previous maximum in 1913. Net importations of gold aggregated \$530,000,000 in 1916, as compared with net importations of \$420,000,000 in 1915. The imports from Jan. 1, 1916, to Jan. 1, 1917, were approximately \$2,350,000,000 and the total exports during the same period were \$5,475,000,000.

The immense volume of American export trade created an unprecedented situation in the shipping world. By the fall of 1915 the quantity of goods for export actually exceeded the carrying capacity of merchant vessels available, in spite of great advances in freight rates and the utilization of every type of craft however old. British experts pointed out that their government had requisitioned for war purposes not less than 50 per cent of the entire British merchant fleet. German submarine activities had destroyed about 6 per cent. Moreover the large German merchant marine was practically nonexistent. Consequently freight rates first doubled, then trebled and quadrupled, and in special cases advanced as much as 900 per cent by the spring of 1916. In some instances a vessel would earn its entire cost on a single round trip. Antiquated steam vessels were selling at prices from two to five times their value before

the war; consequently there developed unprecedented activity in American shipbuilding yards. By April 1, 1916, orders had been given for 360 vessels with a tonnage of more than 1,000,000, and 6,000,000 were expected in 1918.

World Trade. The war seemed destined to have permanent and far-reaching effects upon the world's commerce. In America active measures were begun before the close of 1915 to strengthen the American hold upon new markets and to increase coöperation in foreign trade after the war. On Dec. 1, 1915, e.g., was organized the American International Corporation, with \$50,000,000 capital. Its purpose was to develop trade connections in foreign countries and promote the investment of American capital abroad. Its organization was led by the National City Bank, which was then engaged in establishing branches in principal South American countries. This bank also had acquired control of the International Banking Corporation with 16 banks in China, Japan, India, the Philippines, and Panama. The Bureau of Foreign and Domestic Commerce and the Federal Trade Commission and numerous business organizations devoted much attention to the furtherance of all efforts to secure a firm grasp of markets previously held by English and German traders. Similarly plans were formulated early in 1916 for systematic study of the demands of Europe during the period of reconstruction following the war. Among the Allies every effort was made to stamp out every trace of German economic penetration, and plans were formulated for reducing German competition upon the restoration of peace. On April 23, 1916, there opened in Paris the International Parliamentary Economic Conference of the Entente Allies for the discussion of trade agreements and legislative measures designed to reduce German competition and facilitate trade among the Allies and their colonies. From Germany it was reported that systematic measures were being taken to prosecute most vigorously efforts to regain lost trade.

Foreign Credits. The commanding importance of the United States as the greatest neutral market of the world made it for the first time in its history a lender on a large scale. During 1915 loans aggregating \$1,000,000,000 were contracted in America by foreign governments, more than four-fifths of the proceeds being expended there for war supplies. Loans to the Canadian Dominion government, eight provinces, and 10 cities aggregated \$147,000,000. Argentina borrowed \$64,000,000; Switzerland, \$15,000,000; Sweden, \$5,000,000; Norway, \$8,000,000; Greece, \$7,000,000; notes of the German Treasury to the amount of \$10,000,000 were sold to American investors. Russia secured loans for \$92,000,000; Italy borrowed \$25,000,000; but the great loans were those contracted by France and Great Britain. In addition to the Anglo-French loan of \$500,000,000, France secured \$75,000,000 on notes, bonds, and collateral; and London banks borrowed \$50,000,000. The purpose of these loans was to equalize rates of exchange, but in spite of them and extensive gold shipments sterling exchange declined to \$4.63 by September, 1915. It was therefore necessary for British financiers to restore a more normal rate. In that month a commission of British and French financiers came to the United States to establish a credit for \$750,000,000 or even \$1,000,000,000. The sum, how-

ever, was reduced to \$500,000,000 after various conferences. A syndicate was formed led by J. P. Morgan and Company which took the loan at 96 or on a basis to yield an average of 5.75 per cent. Early in 1916 Argentina secured an additional \$15,000,000; and Canada, \$75,000,000.

Prices and Food Supplies. Inevitably the war had a far-reaching effect upon the movements of prices throughout the world. War not only destroys existing property, but it requires the creation and consumption of goods in amounts immensely greater than the demands of peace. All sorts of raw materials are required in unprecedented amounts and their prices together with those of products made from them rise correspondingly. The most striking advances were those of copper, nickel, lead, zinc, and all kinds of steel products, together with the various constituents used in the manufacture of explosives; but even more important in their effect upon the general welfare of the inhabitants not only of belligerent but of all other nations was the rise in the prices of food products. Thus, e.g., the price of copper rose from about 12 cents to nearly 30 cents per pound; cotton doubled in value; and food prices rose so extensively that administrative measures to regulate them were undertaken by Austria, Bulgaria, Denmark, Egypt, France, Germany, Great Britain, Greece, Holland, Italy, Norway, Russia, Serbia, Spain, Sweden, Switzerland, and Turkey. Most of these countries prohibited the exportation of foodstuffs. In most of them municipal authorities either alone or in conjunction with national or military authorities fixed maximum prices.

The actual extent of the rise in prices is best indicated by index numbers. For the United States *Bradstreet's Index* rose from \$8.7087 on August 1 to \$9.8495 on August 15, 1914. It dropped during the next 10 weeks and thereafter rose steadily to \$11.7598 on April 1, 1916. In Great Britain an astonishing rise in the price of coal resulted in the appointment of a commission of investigation in March, 1915. This body found that the increase of 100 per cent or more was a natural consequence of the recruiting of nearly 250,000 miners and increases in cost of transportation. According to the *Board of Trade Labour Gazette* retail food prices advanced from July, 1914, to March, 1916, by 45 per cent in small towns and 51 per cent in large towns, an average of 48 per cent for the United Kingdom.

The greatest interest attached to the question whether Germany could be starved into submission. Normally the annual excess of German food imports over exports is considerable. In 1912 and 1913 this excess amounted to 2,000,000 tons of wheat, 3,000,000 tons of barley, 1,000,000 tons of corn, and 500,000 tons of rice and potatoes. There are normally also large imports of meat and animal products, oil cake, and fodder. Imports amounted to about 40 per cent of the annual consumption of meat products, and 20 to 30 per cent of grains and vegetable products. The war cut off most of the imports; the campaigns in East Prussia and Alsace destroyed crops; agricultural labor was reduced; North Sea fisheries were closed; and Chile fertilizer no longer available. Nevertheless considerable supplies were still derived from Holland, Scandinavia, and Switzerland, and through military and diplomatic operations large supplies of grain and fodder were procured

from Bulgaria and Rumania. Moreover the entire economic resources of the Empire were mobilized by the early creation of an economic general staff, "The Division of Raw Materials of War," which reorganized industry, reduced consumption, reclaimed old materials, utilized by-products, created new materials and new chemical and industrial methods, erected factories, controlled goods seized by the armies and had great powers of appraisal and price fixing.

By January, 1915, the extravagance of many consumers, the speculation in food prices, and the manipulation of food supplies and markets induced the government to extend its control. On January 25 it was decreed that all supplies of wheat and rye should come under control of the War Grain Association; and local supplies were placed in charge of Communal Associations. The consumption of cereals was brought under the supervision of an Imperial Distributing Bureau. In February a system of regulating the bread supply by bread cards, which limited the weekly consumption of each individual or family, was instituted. With the passage of time similar regulations were extended to meat and vegetables, and finally in May, 1916, the control of all food supplies was placed in charge of a "food dictator" or government bureau. While the best statistical evidence seemed to indicate that food supplies were sufficient to meet minimum requirements there was some evidence that high prices led to serious food riots and much popular discontent late in 1915 and in 1916. According to the Prussian official *Statistische Korrespondenz* the prices of 20 important food products rose 88.5 per cent from July, 1914, to Feb. 1, 1916.

In Vienna official reports showed an advance of 112.9 per cent in 17 important foods from July, 1914, to December, 1915. In Italy the general level of food prices was 31.2 per cent higher in December, 1915, than in July, 1914. The official index of retail food prices in Australia advanced 31 per cent from July, 1914, to July, 1915; 39 per cent to August, 1915; and then fell, being 31 per cent higher in November, 1915, than in July, 1914. In New Zealand general prices rose 30 per cent from August, 1914, to December, 1915, inclusive. Official publications showed that in Copenhagen the cost of living rose 24.2 per cent from July, 1914, to February, 1916; for food prices alone the advance was 33.4 per cent.

Cost of the War. The real cost of war should be measured in terms of the sacrifices of the people engaged in it and of the rest of the world. Such sacrifices would include not merely the loss of lives of those killed in combat, the sufferings of the wounded, and the increased death rate both during and after the war consequent upon injuries and deprivations, but also the labors, hardships, and sufferings imposed upon the soldiers and the non-fighting population both during actual hostilities and during the long years of recuperation thereafter. It is evident that such a cost cannot be computed. Even when measured in financial terms the cost should include not merely the huge public expenditures but also the dislocation, misdirection, and destruction of productive power, both of labor and of capital, and the destruction of private and public property, works of art, and great historical landmarks. It is evident that these latter items can be only

roughly approximated. Consequently the cost of war is usually stated in terms of governmental expenditures.

The following tables from *The Wall Street Journal* give a statement of the war loans of both belligerents and nonbelligerents up to March 1, 1916. The first table states in thousands of dollars (i.e., 000 omitted) the debts of belligerents before the war and on March 1, 1916. In the case of Germany the debts of both the Empire and the states are included; and the war loans of France include advances from the Bank of France.

COUNTRY	Pre-war debt	War loans	Present debt
Great Britain....	\$3,485,000	\$7,670,000	\$11,155,000
France.....	6,607,000	6,590,000	13,197,000
Russia.....	4,537,000	4,117,500	8,654,500
Italy.....	2,836,000	1,465,000	4,301,000
Total for Allies..	\$17,465,000	\$19,842,500	\$37,307,500
Germany.....	5,198,000	6,415,000	11,613,000
Austria-Hungary..	3,970,000	2,547,500	6,517,500
Turkey.....	640,000	214,000	854,000
Central Powers	\$9,808,000	\$9,176,500	\$18,984,500
Grand total..	\$27,273,000	\$29,019,000	\$56,292,000

The approximate per capita indebtedness on March 1 was: Great Britain, \$242; France, \$330; Germany, \$177; Austria-Hungary, \$159; Italy, \$87; and Russia (in Europe), \$57.

The daily cost of war gradually increased from less than \$40,000,000 per day at the beginning to fully \$122,500,000 per day to January, 1918. The following table estimates total and daily costs.

COUNTRY	Cost to Jan. 1, 1918	Daily cost
Great Britain..	\$27,236,500,000	\$32,500,000
France.....	18,405,000,000	17,000,000
Russia.....	14,340,000,000	16,000,000
Italy.....	7,650,000,000	10,000,000
Other Allies	2,165,000,000	3,000,000
Total for Allies..	\$69,796,500,000	\$78,500,000
Germany.....	24,455,000,000	27,000,000
Austria-Hungary..	10,475,000,000	15,000,000
Turkey and Bulgaria	1,755,000,000	2,000,000
Central Powers..	\$36,685,000,000	\$44,000,000
Grand Total..	\$106,481,500,000	\$122,500,000

The loans of the various belligerents from the beginning of the war to March 1, 1916, aggregated over \$29,000,000,000. Of this enormous sum the Allied Powers had contracted 68 per cent and Great Britain alone 26 per cent or more than one-fourth. British loans included the first war loan of \$1,750,000,000 of 3½ per cent bonds on a basis of 3.97 per cent; the second war loan of \$2,925,000,000 of 4½ per cent bonds on a basis of 4.58 per cent; and treasury bills of over \$2,000,000,000. There were also included loans for Canada, India, and Australia aggregating over \$260,000,000, one-half of the Anglo-French loan in the United States, and advances to Allies and colonies exceeding \$2,000,000,000. In addition to the above the English Chancellor of the Exchequer had announced in February, 1916, that an additional war credit of \$2,500,000,000 was immediately needed, bringing the English total of loans to

over \$10,000,000,000. The principal item for France was the Loan of Victory of 5 per cents at 87 to yield 5.75 per cent aggregating \$3,100,000,000. There were advances from the Bank of France to Feb. 17, 1916, of \$1,120,000,000; bonds and notes in London of \$506,000,000; and one-half of the Anglo-French loan, besides notes and banking credits in New York amounting to \$80,000,000. France had also issued national-defense bonds to the amount of \$1,392,584,000. Russia had issued four internal loans aggregating \$1,545,000,000; 4 per cent bonds to the amount of \$309,000,000; treasury bills at 5 per cent aggregating \$1,364,750,000; and had contracted loans in England, France, Japan, and the United States to complete her total. In Italy there had been three issues of 25-year bonds bearing 4½ or 5 per cent in the aggregate amount of \$1,190,000,000. In addition she had contracted obligations in England for \$250,000,000 and in the United States for \$25,000,000. France and England had advanced to Belgium \$218,000,000. Japan issued a loan for \$26,000,000 in 1914. Serbia had secured \$33,000,000 from France.

The German loans began with a 5 per cent issue at 97.5 in September, 1914, to the amount of \$2,125,000,000. A second issue of 5 per cents at 98 in May, 1915, totaled \$2,250,000,000. A third in September, 1915, at 99 aggregated \$3,000,000,000. The fourth loan bearing 5 per cent interest, the books for which were closed in April, 1916, reached \$2,500,000,000. Special banks (*Darlehnskassen*) were established by the government for the purpose of advancing money on securities of various kinds, such money to be invested in the loans. Similar advances of paper money (*Darlehnskassenscheine*) were made on goods for export but unable to leave Germany during the war. In some cases even pledged property, household goods, and instruments of trade could be mortgaged to these banks in order to secure funds for investment in the war loans. In the second loan the bonds of the first loan were accepted in part payment; but the amount of such transactions was not published. In the third loan the government exchanged its obligations for contracts of manufacturers and traders to deliver to the government goods of a specified value. It was believed by many that the slight resort to taxation, the great expansion of paper currency, and excessive use of credit were unsound methods of war finance.

The Austro-Hungarian loans included a first, second, and third Austrian loan aggregating \$1,782,000,000 and a first and second Hungarian loan aggregating \$471,000,000 besides loans contracted in Germany to the amount of \$298,500,000. The actual expenditures, however, of the Dual Monarchy were somewhat shrouded in mystery. In floating their loans special banks and methods similar to those adopted in Germany were used. Turkey contracted two loans in Germany amounting to \$214,000,000; and Bulgaria obligated herself to German bankers to the extent of \$30,000,000.

In addition to the foregoing various neutral countries had been forced to contract loans by the added expenditures made necessary by the war. These amounted to \$143,000,000 in Holland; \$40,000,000 for Rumania; \$25,000,000 for Egypt; \$51,000,000 for Switzerland; \$28,000,000 for Denmark; \$24,800,000 for Spain; \$16,000,000 for Norway; \$14,380,000 for Sweden; and \$8,000,000 for Greece.

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COURSES OF READING AND STUDY

Preface

THE purpose of the present volume, as its name suggests, is to offer help towards self-instruction in the various arts and sciences, utilizing the *New International Encyclopædia* as a general text-book. There is little need to emphasize in this place the rôle of popular educator played by a work like the Encyclopædia. This has been long recognized; and, from a mere work of reference consulted at odd moments for fragments of information, the modern Encyclopædia has become in thousands of homes a source of common culture, the basis of a thorough training in the principles and facts of History, Law, Literature, the Fine Arts, Religion, Biology, Engineering, Physics, Chemistry, or Agriculture. Especially where access to large libraries is difficult or impossible, its value is apparent. In every department of human knowledge, it speaks with a copiousness unequaled in the average text-book and a degree of authority attainable only when every department, and subdivision of a department, is covered by an acknowledged specialist in the field.

A glance at any chapter in the book will show the method pursued. The aim has been to make every chapter a complete summary of the subject with which it deals by arranging the material as the reader or student would find it arranged in a systematic treatise on the subject. The amount of text in each chapter has necessarily been reduced to a minimum, only so much being given as is essential to trace the connection between the successive groups of titles. But, when it is considered that every title in every group represents from two or three hundred to fifteen thousand words of text, the completeness of treatment will be realized.

Within the chapter the material has been divided and subdivided in such a manner as to facilitate study on special topics. If the reader, for instance, desires to make himself particularly well acquainted with a certain period in American History, he need but turn to the proper section in Chapter I., where the subject of American History is outlined in five sub-headings with as many groups of titles; and at the end of the section on American History he will find a list of authorities in whose works he may carry on supplementary reading to any extent. In the same manner, a person interested in the ceremonial or hymnology or clerical vestments of the Roman Catholic Church will find these topics treated in related groups of titles as a section in the chapter on Religion. Under Chemistry one may study the entire subject, carefully outlined for such a purpose, or may concentrate on the acids or the salts or the fats. In every chapter, the technical exposition is supplemented by comprehensive lists of biography wherein the historical aspect of the subject finds complete treatment.

In quoting titles in the lists, the form given is that, of course, which appears in the Encyclopædia; as, CRUELTY TO CHILDREN, PREVENTION OF; or, MACHINERY, ECONOMIC EFFECTS OF. Where reference is made to a long article, the particular section is indicated; as, "See section *The Renaissance* under SCULPTURE," in which case, the reader will turn to Sculpture in the Encyclopædia. In the biographical

titles, the full Christian name, or the corresponding initials, is given as a rule; as ADAMS, SAMUEL; ADAMS, H., KIPLING. The alphabetic arrangement of titles in the *Encyclopædia* makes reference to volume and page obviously superfluous.

It is in its orderly marshalling of the material contained in the *Encyclopædia* that we believe the value of this book consists. It is quite unlikely that the average reader, left to his own guidance, will plan his course in such a manner as to produce the fullest results with the least waste of time. Where the subject is unfamiliar, he is as apt at the start to hit upon the middle of it as upon the beginning, and, in passing from article to article, there is always the danger of his missing the logical sequence of topics. A mere index would here be useless. What is necessary is a carefully planned outline that shall lead the reader, step by step, from elementary principles to the most specialized treatment. Such a guide this Outline aims to be.

The preparation of this volume, carried on under the supervision of the Editors, has been in the direct charge of Mr. SIMEON STRUNSKY, of the staff of the *New International Encyclopædia*, and the supervision of the revision for the second edition under the charge of Mr. IRWIN SCOFIELD GUERNSEY.

—THE EDITORS.

Contents

CHAPTER	PAGE
1. HISTORY	1
2. LAW AND POLITICAL SCIENCE	41
3. SOCIOLOGY	54
4. POLITICAL ECONOMY	61
5. ANTHROPOLOGY	67
6. RELIGION	73
7. EDUCATION	90
8. PHILOSOPHY AND PSYCHOLOGY	95
9. LANGUAGE AND LITERATURE	104
10. THE FINE ARTS—ARCHITECTURE	127
11. THE FINE ARTS—SCULPTURE AND PAINTING	137
12. THE MINOR ARTS	151
13. MUSIC	155
14. MATHEMATICS	161
15. ASTRONOMY	166
16. PHYSICS	170
17. AËRONAUTICS	178
18. CHEMISTRY	179
19. INDUSTRIAL CHEMISTRY	188
20. HOME ECONOMICS AND DOMESTIC SCIENCE	193
21. INTERIOR DECORATION AND DECORATIVE ART	195
22. GEOLOGY	197
23. METEOROLOGY	209
24. GEOGRAPHY	212
25. BOTANY	219
26. AGRICULTURE, HORTICULTURE, AND FORESTRY	234
27. ZOÖLOGY	243
28. MANUFACTURES AND ENGINEERING	255
29. EFFICIENCY AND INDUSTRIAL MANAGEMENT	270
30. MILITARY AND NAVAL SCIENCE	271
31. THE GREAT WAR	285
32. MEDICINE	293
33. MANNERS AND CUSTOMS	308
34. GAMES AND SPORTS	311

Chapter 1. History

HISTORY, which we may define as the record of man's life on earth and the sum of his achievements, would include in its broadest aspect the entire story of human development from Palæolithic man to the present day. As a matter of convenience, however, in this book we shall leave the beginnings of associated human life to be treated under the heading of Anthropology and Ethnology, where, too, will be found the material for the stories of those peoples and tribes which to the present day have remained without the pale of our civilization. Here we shall take up the narrative at a point in time when we first catch a glimpse of the nations whose culture, evolved during thousands of years, and passed on from hand to hand, has become the heritage of the present day. The traditional division into Ancient, Mediæval, and Modern history is followed, and in accordance with custom the account begins with the nations of the Mesopotamian region, and passes on through Persia and the empire of Alexander into Rome, where also the course of Egyptian, Jewish, Phœnician, and Greek history, taken up in turn, leads us. With Rome, Ancient history ends. India, China, and Japan, though their history goes back to a past coeval with the period we call ancient, are treated apart because of their far less intimate connection with the civilization of Europe, wherein our interest is centered. Mediæval history takes up the story at the fall of Rome, traces the amalgamation of the old world with the new, the growth of the Church, the rise of States, and the transition, through inward development and outward contact with Asia and America, to modern times. There European history becomes largely the story of nations and their conflicts. One by one due treatment is accorded them, the field widening as Australia, Africa, and Asia come within the scope of European interests. The record ends with a section on the history of the United States outlined with greater detail than the account of other lands.

First some conception of the methodology of historical writing and a bird's eye view of the history of the world may be useful, for which see:

History
Asia
Europe

Africa
America
Australia

A. Ancient History

1. BABYLONIA, ELAM, AND ASSYRIA.

Archæological research has carried back the origin of Sumerian and Akkadian civilization to the fifth millennium B. C., given us a fairly continuous history of Babylonia, Elam, and

Assyria, and revealed something of the literature, science, art, laws, and social life of these countries. Babylonia was ruled at times by Gutians, Elamites, Kassites, Assyrians, and Chaldeans, but always exercised a power-

ful cultural influence. The Assyrians established an empire that finally included Elam, Mesopotamia, Syria, and Egypt. A part of it fell to the Chaldean kingdom, which was conquered by Cyrus in 539 B. C. See:

(a) For the Land:

Mesopotamia
Euphrates
Tigris
Babylonia
Assyria
Arrapachitis
Adiabene
Shinar
Elam

(b) For the Cities:

Nippur
Babylon
Calah
Ur
Erech
Nineveh
Assar
Khorsabad

(c) For the Kings:

Sargon
Hammurapi
Shalmaneser
Tiglath-pileser
Asurnazirpal
Sennacherib
Esarhaddon
Sardanapalus
Nabonassar
Nabopolassar
Nebuchadnezzar
Belshazzar
Cyrus

(d) For the People, Religion, and Language:
Sumerian Language

Chaldeans
Kassites
Amorites
Mitannians
Merodach
Ishtar
Semitic Languages
Babylonian Art
Assyrian Art
Cuneiform Inscriptions

(e) For the Historians and Investigators:

Botta, P. E.
Delitzsch, F.
Layard, A. H.
Meyer, E.
Oppert, J.
Rassam, H.
Rawlinson, H. C.
Sayce, A. H.
Schrader, E.
Smith, G.
Winckler, H.

2. EGYPT.

From the monuments it is evident that the Egyptian civilization was in its origin independent of the Babylonian and goes back to as early an antiquity. From primitive times when the land was divided into two sections, the Delta and the South, we pass through many dynasties of pyramid and temple building kings to a time of subjugation by foreign invaders, of conquests in Palestine and Asia Minor, of decline, and of reduction by the Persians, by Alexander of Macedon, and by Rome. A cheerful people, influenced greatly by their priests, submissive to their kings, worshiping many gods and animals, they left behind them massive structures of which we have not yet the secret. Their

priests read the stars and knew geometry, speculated on the soul, and probably passed on to the Phœnicians the alphabet which was to be ours. (?— B. C. 30) See:

(a) For the Land:

Egypt
Nile
Delta
Nubia
Ethiopia
Libya
Suez Canal

(b) For the Cities and Monuments:

Memphis
Tanis
Thebes
Karnak
Luxor
Ramesseum
Pyramid
Rosetta Stone

(c) For the Kings:

Menes
Cheops
Chephren
Amenemhat
Usertesen
Amasis
Amenophis
Thothmes
Hatasu
Rameses
Psammetichus
Necho
Amasis II
Ptolemy
Cleopatra

(d) For the People, Religion, Language, and Culture:

Egypt
Hamites

Hyksos

Rê

Horus

Osiris

Thoth

Athor

Ammon

Apis

Set

Isis

Nephthys

Anubis

Hieroglyphics

Egyptian Art

Egyptian Music

(e) For the Historians and Investigators:

Egyptology
Breasted, J. H.
Brugsch, H. K.
Champollion, J. F.
Lenormant, C.
Lepsius, K. R.
Manetho
Mariette, A. E.
Maspero, G. C. C.
Naville, E. H.
Petrie, W. M. F.
Renouf, P.
Rougé, O. C. E.
Sayce, A. H.
Wilkinson, J. G.

3. PHœNICIA AND ASIA MINOR.

What is now Syria and part of Asia Minor was in the earliest times debatable ground between Egypt and the Mesopotamian monarchies. On the Palestinian coast the Phœnicians, with little territory, developed a splendid industry and commerce and in their ships carried the seeds of Babylonian and Egyptian civilization over the Mediterranean basin. Later, when the

Hyksos were invading Egypt, a people known as the Hittites appear, stout fighters who render a good account of themselves against the Assyrians and Egyptians. Their homes were in Northern Syria and in Eastern Asia Minor, but about B. C. 700 they disappeared, leaving little trace behind them. See:

(a) For the Phœnicians:

Phœnicia
Sidon
Tyre
Acre
Byblos
Cyprus
Carthage
Hiram
Melkarth
Astarte
Phœnician Art
Amarna Letters

(b) For the Hittites:

Hittites
Syria
Boghaz-Keui
Eyuk
Mitannians
Cappadocia
Carchemish
Marash
Hamath

persecution, escape, conquering for themselves the land of Canaan and passing thereby from the nomad into the agricultural stage. See:

Jews
Palestine
Goshen
Semitic Languages
Abraham
Isaac
Jacob
Esau
Amarna Letters
Exodus
Moses
Aaron
Joshua
Canaan
Simcon
Judah
Levi
Gad
Naphtali
Issachar
Dan
Zebulun
Ephraim
Benjamin

Ruled by warrior leaders for a long period, the people finally obtain a king, but after a hundred years the nation breaks into two, the northern, Israel, falling to Assyria, the southern, Judah, 150 years later to Babylonia. The Babylonian exiles return and re-establish the Jewish state in the form of a theocracy based on a purified Yahwe worship. See:

Jews
Saul
David
Jerusalem
Solomon

4. THE JEWS.

The Jews form the third in the group of peoples lying between Egypt and Babylonia and affected by the influence of both. The Hebrews, a Semitic tribe of nomads, after wandering through the land of Canaan, enter the land of Goshen, a territory belonging to Egypt, are there held in bondage, and, hammered into a nation by

Judah
 Jeroboam
 Joash
 Abimelech
 Jehosaphat
 Ahab
 Josiah
 Hezekiah
 Samaritans
 Babylonia
 Nehemiah
 Ezra
 Cyrus
 Amorites
 Philistines
 Aramæans
 Ammon
 Moab
 Edom
 Judges, Book of
 Kings, Books of

Pharisees
 Zealot
 Essenes
 Zadokites
 Messiah
 Bar-Kokba
 Spain
 Crusades
 Anti-Semitism
 Zionist Movement

(b) For the Law, Language, Literature, and Science:

Bible
 Pentateuch
 Talmud
 Gemara
 Mishna
 Cabbala
 Halacha
 Haggada
 Midrash
 Maimonides
 Yiddish

(c) For the Historians:

Josephus, Flavius
 Ewald, G. H.
 Wellhausen, J.
 Renan, E.
 Graetz, H.

The reëstablished State passes from the suzerainty of Persia to that of Macedonia, the Seleucid kings of Syria, and Rome, rising against whom, Jerusalem is taken (A. D. 70), the Temple destroyed, and the greater part of the nation scattered over the Roman world. The insurrection of Bar-Kokba in the second century is the last forcible assertion of the national spirit. The Jews now enter upon their historic rôle of wanderers, subject alternately to persecution and favor at the hands of rulers and peoples, and held together as a folk by the Law and the Talmud. See:

(a) Jews

Babylonish Captivity
 Antiochus
 Maccabees
 Herod
 Sadducees

5. PERSIA.

In northeastern Iran, a people, the Medians, shake off the yoke of Assyria in the eighth century B. C. and soon attain power over their former masters, but fall themselves under the domination of the Persians and Cyrus, who brings under his sway all of Mesopotamia and Palestine. Under his successors Persia becomes the greatest empire of pre-Alexandrian times, spreads to the Mediterranean, and enters Egypt, but fights vainly against the Greeks and is conquered by the young

hero of Macedon. The empire falls apart, the heart of it, Persia proper, passing in turn to the Parthians, Arabs, Turks, Mongols, and Turks again, till it remains what it is at the present day, a piece in the game between England and Russia in Asia. See:

(a) For the Land and the People:

Iran
Media
Persia
Asia Minor
Bactria
Parthia
Armenia
Susa
Persepolis
Ctesiphon
Ecbatana

(b) For the Dynasties and Kings:

Achæmenidae
Seleucidæ
Arsacidæ
Sassanidæ
Abbasides
Samani and Dilemi
Ghaznevides
Ghuri
Seljuks
Astyages
Cyrus
Cambyses
Darius
Xerxes
Artaxerxes
Khosru
Hulaku Khan
Timur
Abbas I.
Nadir Shah

(c) For the Culture:

Persian Art

Persian Language
Persian Literature

6. GREECE.

The seeds of culture brought to Greece by the Phœnicians from Babylon, Egypt, and Asia Minor, developed into a new civilization, the highest in many respects the world has as yet seen, which influenced mightily the history of future ages. The legendary accounts, in the tales of heroes and gods, probably reflect historical conditions. See:

Mythology
Danaüs
Cadmus
Hercules
Theseus
Minos
Argonauts
Trojan War
Agamemnon
Ulysses
Achilles

Greek history begins with a succession of great migrations from the mainland eastward towards Asia Minor. When authentic history begins, Greece appears as an agglomeration of small independent states, in a state of transition from the monarchical form of government into tyrannies, oligarchies, and democracies. See:

(a) For the Land:

Greece
Asia Minor
Crete
Thessaly
Bœotia
Epirus
Attica
Peloponnesus

Eubœa
 Lesbos
 Chios
 Ithaca
 Pydnus
 Olympus
 Delos

(b) For the Cities:

Athens
 Sparta
 Thebes
 Mycenæ
 Tiryns
 Argos
 Corinth

(c) For the People:

Archæology, II
 Hellenes
 Danai
 Dorians
 Ionians
 Æolians
 Achæans

(d) For the Men:

Lycurgus
 Solon
 Pisistratus
 Clisthenes

Greece
 Athens
 Miltiades
 Marathon
 Themistocles
 Salamis
 Thermopylæ
 Aristides
 Leonidas
 Ephialtes
 Pericles
 Conon
 Nicias
 Sparta
 Syracuse
 Lysander
 Agesilaus
 Antalcidas
 Pausanias
 Epaminondas
 Pelopidas
 Mantinea
 Leuctra
 Macedon
 Philip II
 Demosthenes
 Æschines
 Alexander the Great
 Chæronæa
 Antipater
 Demetrius Poliorcetes
 Ætolian League
 Achæan League
 Philopœmen
 Pydna
 Cynoscephalæ

The Greeks, after a long, successful struggle against Persia, won national greatness. Democratic Athens first takes the lead among the Greek city states and for a half century plays a brilliant part, then succumbs to Sparta, which in turn falls before Thebes. Disunion brings Greece under the sway of Macedon, whose young king, Alexander the Great, conquers Persia and Egypt and spreads the Hellenic culture in his new realm. Greece proper is ruled by Macedon till it falls with Macedon under the power of Rome. See:

In the Greek city states the problems of democracy were well worked out, and politics became an exact science. The principles of democracy were carried over the basin of the Mediterranean and the Black Sea, wherever the Greeks, the successors of the Phœnicians as traders and colonizers, went. See:

(a) For Greek Government :

Monarchy
 Tyrant
 Democracy
 Aristocracy
 Despot
 Ecclesia
 Arcopagus
 Ostracism
 Boule
 Ephori
 Archon
 Solon
 Lycurgus
 Lysander

(b) For the Greek Colonies :

Ionia
 Mitylene
 Ephesus
 Halicarnassus
 Chalcidice
 Colchis
 Chersonesus
 Cyrene
 Sicily
 Magna Græcia
 Marseilles

Over all the Greek world the Hellenic culture prevailed as in the home country. See:

Architecture, Greece
 Greek Language
 Greek Literature
 Greek Music
 Greek Art
 Greek Philosophy

The Greek religion passed from an unrestrained polytheism into an anticipation of monotheism on the part of the select few, into gross superstition on the part of the many. See:

Olympus
 Pantheon

Jupiter
 Juno
 Apollo
 Mercury
 Vulcan
 Ceres
 Venus
 Diana
 Mars
 Minerva
 Neptune
 Pluto
 Greek Religion
 Greek Festivals
 Games
 Olympic Games
 Mysteries

For the Historians :

Herodotus
 Thucydides
 Xenophon
 Plutarch
 Polybius
 Dio Cassius
 Dionysius of Halicarnassus
 Arrianus
 Theopompus
 Diodorus Siculus
 Curtius, E.
 Finlay, G.
 Grote, G.
 Schliemann, H.

7. ROME.

Greek civilization was imposed on the peoples of Europe, Northern Africa, and Western Asia by the armies of Rome, whose origin goes back to a settlement of Latin outlaws and shepherds on one of the seven hills south of the Tiber. A legendary kingdom gives way, about the beginning of the sixth century B. C., to a republican

form of government. A long contest between privileged and non-privileged classes results in the elaboration of a splendidly efficient system of municipal government. See:

(a) For the Land and the People:

Rome
Italy
Latium
Italic Languages
Latini
Etruria
Samnites

(b) For the Cities:

Rome
Alba Longa
Veii
Tarentum
Capua
Naples
Brindisi
Pompeii
Herculaneum

(c) For the Kingship and the Struggle between Classes:

Romulus
Numa Pompilius
Tarquinius
Comitia
Patrician
Plebeians
Consul
Tribune
Prætor
Censor
Ædiles
Senate
Decemviri
Hortensius
Licinian Rogations

conquest and by means of her splendid military art and unscrupulous diplomacy makes herself mistress of Latium, of Italy, and, after a struggle with Carthage, with Macedonia, and with Syria, of the Mediterranean basin. Unchecked power, however, brings corruption within the State, republican institutions tend to become empty forms, factional strife breaks out, the Senate rules for a while and then succumbs to the ambition of masterful politicians; in the conflict of parties the Republic meets its end. See:

Gaul
Camillus
Pyrrhus
Carthage
Punic Wars
Hamilcar
Hasdrubal
Hannibal
Hispania
Cannæ
Zama
Scipio
Macedonia
Antiochus
Gracchus
Agrarian Laws
Jugurtha
Marius
Sulla
Pompeius
Mithridates
Cicero
Catiline
Cæsar
Cassius
Brutus
Crassus
Antonius
Cleopatra
Actium

With her internal problems settled, Rome enters upon a career of foreign

The Roman Empire, established by Augustus before the beginning of the present era, attained its greatest extent in the early years of the second century of that era and entered on its decline towards the end of the same century. At its height it embraced within its limits the classic world. Peace, excellent means of communication, and an unrivalled administrative system brought the different parts of the Empire close together and facilitated the spread of Greek culture and later of Christianity. The decline of the Empire, due to the decay of old age and the onset of the barbarian tribes of Northern Europe, is arrested by the reforms of Diocletian and of his successor Constantine the Great, who, in the beginning of the fourth century, makes Christianity the State religion. See:

Augustus
Tiberius
Caligula
Claudius
Nero
Vespasian
Titus
Domitian
Trajan
Hadrian
Antoninus Pius
Aurelius
Commodus
Severus, Septimius
Caracalla
Severus, Alexander
Aurelianus
Diocletian
Prætorian Guard
Constantine the Great
Christianity

After Constantine the decline is pre-

cipitate. The ancient Roman prowess is gone, and the defence of the Empire is entrusted to barbarian mercenaries; the task of government becomes too heavy for one man, and the Empire is divided in two. The wave of barbarian migration breaks with full force upon the Western Empire, and the last emperor of Latin Rome is dethroned in 476. See:

Migration
Parthia
Julian
Theodosius
Stilicho
Alaric
Attila
Huns
Goths
Vandals
Burgundians
Odoacer
Ravenna
Honorius
Augustulus
Aëtius

The Romans were preëminent for their political genius; their literature, in part, their philosophy, and their art were copies of the Greek, and the general culture at the time of the Empire's zenith was Hellenistic; their gods, too, were largely borrowed or adapted from the Greek pantheon; but in administration and law they were unexampled innovators and in these fields they influenced subsequent European civilization mightily. See:

(a) For the Religion:

Roman Religion
Jupiter
Janus
Mars

Quirinus

Vesta

Auguries and Auspices

Flamens

Lupercalia

Salii

(b) For the Language and Culture:

Italic Languages

Latin Language

Latin Literature

Roman Art

Philosophy

(c) For Administration and Law:

Civil Law

Justinian

Twelve Tables

Jus Gentium

Municipality

Papinianus

Paulus

Pandects

(d) For the Historians:

Ammianus Marcellinus

Annals

Appianus

Eutropius

Ferrero, G.

Gibbon, E.

Ihne, W.

Livy

Merivale, C.

Mommsen, T.

Niebuhr, B. G.

Sallust

Suetonius

Tacitus

B. Mediæval History

1. The East Roman or Byzantine Empire continued to exist for a thousand years. Within the limits of the Western Empire the Germanic tribes settled as masters, and from their gradual amalgamation with the conquered Roman provincials date the beginnings of the modern peoples of Europe. The most powerful of the barbarian kingdoms, that of the Franks, attained imperial extension under Charles the Great, who, by his alliance with the Pope, established the connection between Empire and Church, which was to become one of the most powerful determinants of events in the Middle Ages. See:

(a) For the Migrations:

Migration

Britannia

Angles

Saxons

Jutes

Gaul

Burgundians

Franks

Hispania

Suevi

Vandals

Italy

Goths

Theodoric

Lombards

Saracens

(b) For the East Roman Empire:

Byzantine Empire

Justinian

Belisarius

Narses

(c) For the Frankish Empire:

Clovis
 Merovingians
 Carolingians
 Brunhilda
 Fredegunda
 Charles Martel
 Pepin the Short
 Donation of Pepin
 Charles the Great
 Papal States
 Salic Law

2. On the death of Charles the Great the Frankish Empire falls apart. Two great kingdoms arise, France and Germany. The Germans make their power supreme in Central Europe and in Italy, and a German king is crowned Holy Roman Emperor, reviving the connection between Church and State established by Charles the Great. A second Teuton stock, the Northmen, appear as conquerors in France, England, Italy, and Russia. The growth of nations proceeds rapidly, and from the relations between conqueror and conquered develops Feudalism. The young nations are brought into conflict with the growing power of the Church, which, under the leadership of the Bishop of Rome, seeks to raise the ecclesiastical power above the secular. The break-up of the Mediæval ages begins with the Crusades. See:

(a) For the Growth of Nations:

Franks
 Verdun, Treaty of
 France
 Neustria
 Germany
 Austrasia
 Franconia
 Swabia

Alemanni
 Otho the Great
 Holy Roman Empire
 Normans
 Normandy
 Varangians
 England
 William the Conqueror
 Italy
 Sicily
 Guiscard
 Russia

(b) For Mediæval Society:

Feudalism
 Feud
 Livery
 Homage
 Knight
 Chivalry
 Esquire
 Heraldry
 Serf
 Ordeal
 Truce of God
 Compurgation

(c) For the Struggle between Church and State:

Gregory VII
 Investiture
 Hohenstaufen
 Guelphs and Ghibellines
 Henry IV of Germany
 Henry V of Germany
 Papacy
 Innocent III
 Philip II of France
 Philip IV of France
 John of England
 Henry II of England
 Frederick I Barbarossa
 Frederick II of Germany

(d) For the Crusades:

Crusades

Papacy
 Hospitalers
 Templars
 Teutonic Knights
 Peter the Hermit
 Urban II
 Godfrey de Bouillon
 Bohemund
 Tancred
 Baldwin
 Antioch
 Richard I of England
 Saladin
 Venice
 Dandolo
 Louis IX of France
 Latin Kingdom of Jerusalem

3. The Crusades were followed by a great increase in the commerce of Western Europe and the rise of an influential burgher class, with whose aid the kings succeeded in making themselves independent of the feudal nobility. With the growth of centralized kingdoms the power of the Papacy declines. Contact with the East and the ancient world stimulated the European mind, and the Revival of Learning, the succession of great geographical and astronomical discoveries, and the invention of gunpowder and printing hasten the transition from the Middle Ages to modern times. The uniformity of European society, characteristic of the Middle Ages, is broken up by the Reformation. See:

(a) For Commerce, Discoveries, and Inventions:

Hanseatic League
 Gunpowder
 Printing
 Copernicus
 Columbus

Gama, Vasco da
 Venice
 Genoa
 Henry the Navigator
 Africa
 America

(b) For the Decline of the Papacy:

Boniface VIII
 Avignon
 Schism, Great
 Constance, Council of
 Basel, Council of

(c) For the Revival of Learning and the Renaissance:

Petrarch
 Bracciolini
 Guarino
 Poliziano
 Lorenzo de' Medici
 Erasmus
 Colet
 Grocyn
 Linacre
 More, Thomas
 Reuchlin
 Hutten, Ulrich von
 Epistolæ Obscurorum Virorum
 Renaissance Art

(d) For the Reformation:

Reformation
 Wiclif
 Huss
 Luther
 Charles V
 Augsburg Confession
 Melancthon
 Schmalkaldic League
 Zwingli
 Calvin
 Huguenots
 Henry VIII of England
 Wishart
 Knox

Counter-Reformation
Trent, Council of
Thirty Years' War

For the Historians:

Creighton, M.
Denifle, F. H.
Emerton, E.
Fisher, G. P.

Fleury, Claude
Gieseler, J. K.
Hallam, H.
Harnack, Adolf
Hefele, K. J.
Lea, H. C.
Neander, J. A.
Pastor, L.

C. Modern History

At the opening of the modern era the process of State formation in Europe had resulted in the establishment of firmly centralized nations in England, France, and Spain. Germany and Italy, on the contrary, were disunited, and destined so to remain till the later years of the nineteenth century. The conflicts of States and nationalities is one of the great features of modern times; till 1648 religion is a fruitful cause of external warfare and civil strife; after 1648 wars are fought on political and commercial grounds. The disappearance of a common Church and of Latin as the common vehicle of communication among the higher classes tended to intensify the differentiation of national characteristics. The burgher class, which had begun to assert itself in the period after the Crusades, rose to full recognition in the life of the State and in turn was forced to render recognition, after the French Revolution, to the lowest classes in the State, artisans and peasants. The Church loses control over the temporal affairs of its members, and even in the spiritual field its authority is subordinated to that of the State. Life takes on a predominantly secular tinge; science broadens the intellectual horizon,

and commerce and colonization bring the non-European part of the Eastern Hemisphere within the sphere of European influence. The history of modern times is best studied in the history of the various nations.

1. ENGLAND.

The Britannia of the Romans is overrun in the age of migrations by Teutonic tribes from Jutland and the northwest of Germany, who, receiving a new infusion of kindred blood from the Danes, are conquered in the eleventh century by a more remote kinsfolk, the Normans—Gallicized Teutons from France. Saxons and Normans are blended into one before 1400, by which time a constitutional system of government, worked out in the course of long conflicts between rulers and subjects, is in force, based on the supreme legislative authority of a Parliament, representing the different estates. Wales and Ireland have been subdued, and Scotland has ceased to be a dangerous rival. Feudalism, never so strong in England as on the Continent, is practically destroyed during the Wars of the Roses in the fifteenth century, and the modern era may be dated from the accession of the Tudors in 1485. See:

England
 Britannia
 Anglo-Saxons
 Heptarchy
 Alfred
 Edward the Confessor
 Canute
 Harold
 Witenagemot
 William the Conqueror
 Hastings, Battle of
 Hereward
 Domesday Book
 William II
 Henry I
 Stephen
 Plantagenet
 Henry II
 Becket
 Ireland
 English Pale
 Richard I
 John
 Magna Charta
 Oxford, Provisions of
 Montfort, Simon de
 Edward I
 Parliament
 Wales
 Llewellyn ap Griffith
 Scotland
 Wallace
 Bruce
 Bannockburn
 Edward II
 Mortimer, Roger de
 Edward III
 Hundred Years' War
 Crécy
 Poitiers
 Black Death
 Richard II
 Tyler's Rebellion
 Ball, John

Wiclif
 Provisors, Statute of
 Præmunire
 Mortmain, Statutes of
 Lancaster, House of
 Henry IV
 Agincourt
 Henry VI
 York, House of
 Margaret of Anjou
 Cade, Jack
 Roses, Wars of the
 Edward IV
 Warwick, Earl of
 Richard III
 Tudor

Under the Tudors the power of Parliament greatly declined. The Reformation, initiated by Henry VIII, soon spread beyond the limits the King would set to it, and England became Protestant. Under Elizabeth it was forced to contend against Spain, the champion of Catholicism. With the defeat of Spain, England enters on her career as ruler of the seas and begins the work of founding a new English-speaking nation across the Atlantic. The death of Elizabeth, the last of the Tudors, gives England and Scotland a common sovereign. A revived Parliament asserts its rights successfully against the absolutism of the Stuarts, dethrones them, recalls them, and drives them as enemies of Protestantism once more from the throne, bestowing the crown upon a prince of Dutch blood. The crowns of England and Scotland are united. On the Continent, England takes a leading part in the overthrow of Louis XIV of France and comes out of the struggle more powerful than ever upon the seas. See:

Henry VII

Parliament
 Star Chamber
 Benevolence
 Henry VIII
 Boleyn, Anne
 Wolsey, Cardinal
 Cromwell, Thomas
 Reformation
 Cranmer
 Edward VI
 Mary I
 Ridley
 Latimer
 Elizabeth
 Supremacy
 Mary Stuart
 Burleigh
 Walsingham
 Leicester
 Essex
 Armada
 Drake
 Howard
 Stuart
 James I
 Charles I
 Petition of Rights
 Ship-Money
 Strafford, Earl of
 Laud
 Long Parliament
 Grand Remonstrance
 Five Members
 Pym
 Eliot
 Hampden
 Cromwell, Oliver
 Vane, Henry
 Blake
 Fairfax
 Ireton
 Scotland
 Covenants
 Presbyterianism

Montrose, Earl of
 Charles II
 Clarendon, Earl of
 Cabal
 Test Acts
 Oates, Titus
 Shaftesbury, Earl of
 James II
 Halifax, Earl of
 William III
 Mary II
 Anne
 Succession Wars (*Spanish*)
 Utrecht, Treaty of
 Marlborough, Duke of
 Bolingbroke
 Harley
 Sacheverell

With the accession of the House of Hanover, the supremacy of Parliament is firmly established; cabinet government is developed, and the rule of party is the order—by the Whigs, roughly speaking, to the French Revolution, by the Tories to 1832, by the two or their successors since then, in comparatively rapid alternation. France is defeated and deprived of her Indian and American possessions, but almost immediately England suffers an irreparable loss in the defection of the thirteen colonies. Partial compensation, however, is found in India, where English adventurers build up a new empire. After the French Revolution and the Napoleonic Wars, comes strife between the advocates of reaction and the rising forces of democracy, stimulated by the great industrial revolution. The latter win in 1832, and the subsequent history of England is one of democratic progress within, of conquest and commercial expansion abroad. See:

United Kingdom
 Whig and Tory
 George IV
 Cabinet
 South Sea Company
 Walpole, Robert
 Newcastle, Duke of
 Chatham, Earl of
 Seven Years' War
 Bute, Earl of
 Grenville
 Townshend
 Wilkes, John
 North, Lord
 Fox, Charles James
 Pitt, William
 Burke, Edmund
 Sheridan, R. B.
 Trafalgar
 Nelson
 Wellington
 Peninsular War
 Canning
 India
 Clive
 Hastings, Warren
 Wellesley, Marquis
 Cornwallis, Lord
 Dupleix
 William IV
 Peterloo Massacre
 Trade Unions
 Russel, Lord John
 Grey, Earl (1st, 2d and 3d)
 Victoria
 Corn Laws
 Peel, Robert
 Cobden, John
 Bright, John
 Palmerston, Lord
 Derby, Earl
 Disraeli
 Gladstone
 Salisbury, Marquis of

Rosebery, Earl of
 Chamberlain, Joseph
 Balfour, Arthur
 Beresford, Lord C.
 Campbell-Bannerman
 Law, A. Bonar
 Morley, Viscount
 Ireland
 Tyrconnel
 Stewart, Robert
 Home Rule
 Roman Catholic Emancipation
 O'Connell, Daniel
 Irish Land Laws
 Fenian Society
 Redmond, J. E.
 Parnell, Charles Stewart
 Australia
 Canada
 Imperial Federation
 Edward VII
 South African War
 French, Sir J. W.
 Union of South Africa
 War in Europe
 Asquith, H. H.
 Lloyd-George, D.
 Kitchener of Khartum
 George V
 Churchill, W. S.
 Curzon, Earl

For the Historians:

Acton, J. E. E. D.
 Bury, J. B.
 Clarendon, Lord
 Elphinstone, M.
 Firth, C. H.
 Freeman, E. A.
 Froude, J. A.
 Fyffe, C. A.
 Gairdner, J.
 Gardiner, S. R.
 Geoffrey of Monmouth

Gildas
 Giraldus de Barri
 Green, J. R.
 Gross, C.
 Gwatkin, H. M.
 Hallam, H.
 Holinshed, R.
 Kinglake, A. W.
 Kingsford, W.
 Lappenberg, J. M.
 Lecky, W. E. H.
 Lingard, J.
 Macaulay, T. B.
 McCarthy, Justin
 Maitland, F. W.
 Napier, W. F. P.
 Oman, C. W. C.
 Palgrave, F.
 Paris, Matthew
 Rose, J. H.
 Seebohm, F.
 Stubbs, W.
 Turner, Sharon
 Walpole, Spencer
 William of Malmesbury

2. FRANCE.

Upon the dissolution of the Frankish Empire in the ninth century, descendants of Charles the Great continue to rule over the land of the Western Franks with a population predominantly Celtic and a language derived from the Latin. This is the beginning of France. The weak Carolingians are replaced by the energetic house of Capet, under which the unification of the country is carried on by such able rulers as Philip II, Louis IX, and Philip IV. The Hundred Years' War is disastrous to the kingdom, but its recovery is rapid under Charles VII and his son, Louis XI, who leave the

power of the crown firmly established. Religious wars in the sixteenth century become a factor for anarchy, but feudalism is definitely crushed by Richelieu, and absolutism is established by Louis XIV, under whom France is for fifty years the overweening power in Europe. Absolutism breaks down under Louis XIV's unworthy successors, and the entire ancient fabric of society is swept away by the French Revolution. See:

France
 Brittany
 Normandy
 Burgundy
 Flanders
 Aquitania
 Anjou
 Navarre
 Franks
 Carolingians
 Verdun, Treaty of
 Capetian Dynasty
 Louis VII
 Philip II, Augustus
 Louis IX
 Philip IV, the Fair
 Valois, House of
 Hundred Years' War
 Crécy
 Poitiers
 John II
 Jacquerie
 Charles VI
 Agincourt
 Du Guesclin
 Dunois
 Joan of Arc
 Charles VII
 Louis XI
 Charles the Bold
 Charles VIII

Louis XII
 Francis I
 Henry II
 Huguenots
 Catharine de' Medici
 Guise
 Condé
 Coligny
 Bartholomew's, Massacre of Saint
 Charles IX
 Henry III
 Politiques
 Henry IV
 Nantes, Edict of
 Sully, Duke de
 Louis XIII
 Richelieu
 Westphalia, Peace of
 Mazarin
 Maintenon, Marquise de
 Louis XIV
 Fronde
 Parlement
 Colbert
 Louvois
 Turenne
 Vendôme, Duke de
 Luxembourg, Duke of
 Villars
 Camisards
 Succession Wars
 Orleans, Philippe, Duke of
 Dubois
 Louis XV
 Seven Years' War
 Pompadour, Marquise de
 Du Barry, Countess
 Louis XVI
 Turgot
 Necker
 Farmers-General
 States-General
 The abolition of feudalism by the
 French National Assembly is followed

by the overthrow of the monarchy.
 Assailed by the rulers of Europe,
 France retaliates, and its conquering
 armies carry the gospel of democracy
 over the Continent. Under Napoleon,
 France dominates Europe until, de-
 feated by a rising of the European
 peoples, it is compelled to take back its
 Bourbon kings. Reaction struggles
 with the advancing ideals of political
 and social revolution, and the country
 witnesses within the century the over-
 throw of three dynasties and the estab-
 lishment of two republics. Under
 Napoleon III, France regains for a
 brief period its ascendancy in Euro-
 pean politics, but suffers overwhelming
 defeat at the hands of a new-created
 Germany. Her latest history has to
 do with the slow grounding of repub-
 lican principles, the adjustment of rela-
 tions between Church and State and the
 great war which began in 1914. See:

French Revolution
 Assembly, National
 Mirabeau
 Marie Antoinette
 Bastille
 National Guard
 Lafayette
 Bailly
 Jacobins
 Feuillants
 Cordeliers
 Barnave
 Pétion
 Pillnitz
 Valmy
 Jemappes
 Dumouriez
 Convention, National
 Girondists
 Brissot

Roland de la Platière
 Vergniaud
 Montagnardes
 Marat
 Danton
 Billaud-Varennes
 Carnot
 Callot d'Herbois
 Robespierre
 Saint-Just
 Vendée
 Hébert
 Jourdan
 Pichegru
 Moreau
 Barras
 Directory
 Sieyès
 Talleyrand
 Josephine
 Napoleon I; III
 Masséna
 Ney
 Murat
 Davout
 Junot
 Marmont
 Lannes
 Soult
 Suchet
 Victor
 Beauharnais
 Continental System
 Code Napoléon
 Separation of Church and State
 Louis XVIII
 Charles X
 Louis Philippe
 Guizot
 Thiers
 Ledru-Rollin
 Blanc, Louis
 Eugénie-Marie de Montijo
 Crimean War

Franco-German War
 Bazaine
 Favre, Jules
 Gambetta
 MacMahon
 Ferry
 Boulanger
 Casimir-Périer
 Faure
 Loubet
 Dreyfus, Alfred
 Waldeck-Rousseau
 Delcassé
 Triple Entente
 Freycinet
 Ribot
 Fallières
 Jaurès
 Poincaré
 Viviani
 Briand
 Gallieni
 Joffre
 War in Europe

For the Historians:

Chéruel, P. A.
 Duruy, V.
 Froissart, J.
 Guizot, F. P. G.
 Hanotaux, G.
 Houssaye, H.
 Joinville, Jean
 Lanfrey, P.
 Lavissee, E.
 Luchaire, A.
 Martin, H.
 Michaud, J.
 Michelet, J.
 Mignet, F. A. M.
 Montalembert, C. F.
 Rambaud, A. N.
 Seignobos, C.

Sorel, A.
 Stephens, H. M.
 Sybel, H.
 Thierry, Amédée
 Thierry, Augustin
 Thou, J. A. de
 Villehardouin, Geoffroy de

3. GERMANY.

German history, like the history of France, may be dated from the dissolution of the Frankish Empire. Unlike France, Germany knew no unity until the very latest times. The establishment of the Holy Roman Empire in the tenth century connected the political fortunes of Germany with those of Italy and the Papacy, and the history of the empire is but the history of the separate states within the empire. After 1273, the imperial dignity is held, as a rule, by members of the house of Hapsburg, and the imperial interests become more and more Austrian. Disunion is fostered by the Reformation and perpetuated by the Thirty Years' War. In the eighteenth century, Prussia enters into competition with Austria for leadership in the empire, which, after existing for more than eight hundred years, is dissolved by Napoleon in 1805. The quarrel between Prussia and Austria is fought out in the nineteenth century, and the former triumphs. A new German Empire is formed, differing from the Holy Roman Empire in its national character, and, as the strongest military power on the Continent, occupies a leading place in the European system. See:

Germany
 Prussia
 Bavaria

Saxony
 Württemberg
 Hanover
 Baden
 Verdun, Treaty of
 Franconia
 Swabia
 Lorraine
 Otho I
 Holy Roman Empire
 Henry II, IV, VI
 Conrad II
 Investiture
 Gregory VII
 Hohenstaufen
 Guelphs and Ghibellines
 Frederick I, Barbarossa
 Frederick II
 Hapsburg
 Rudolph I
 Austria-Hungary
 Charles IV, V, VI
 Golden Bull
 Electors
 Sigismund
 Maximilian I
 Aulic Council
 Reformation
 Passau, Treaty of
 Bohemia
 Thirty Years' War
 Leopold I
 Pragmatic Sanction
 Frederick William I, III, IV
 Frederick II
 Maria Theresa
 Succession Wars (*Austrian*)
 Seven Years' War
 Francis II of Austria
 Stein
 Scharnhorst
 Blücher
 Gneisenau
 Leipzig, Battles of

Waterloo
 Vienna, Congress of
 Metternich
 Burschenschaft
 Zollverein
 Frankfort, Council of
 Seven Weeks' War
 Bismarck-Schönhausen
 Moltke
 William I
 Kulturkampf
 Triple Alliance
 William II
 Caprivi
 Hohenlohe
 Bülow
 Bethmann-Hollweg
 Jagow
 Hindenburg
 Tirpitz
 War in Europe

For the Historians:

Bulle, K.
 Dahlmann, F. C.
 Dahn, F.
 Droysen, J. G.
 Dümmler, E.
 Erdmannsdörffer, B.
 Gfrörer, A. F.
 Giesebrecht, F. W. B.
 Häusser, L.
 Janssen, J.
 Lamprecht, K.
 Marcks, E.
 Maurenbrecher, W.
 Müller, Johannes
 Oncken, W.
 Ranke, L.
 Raumer, F. L.
 Sybel, H.
 Treitschke, H.
 Waitz, G.

4. AUSTRIA-HUNGARY.

Austria-Hungary is a political unit merely and in no sense a national State, and its history is largely that of the several states that compose it. The relationship to European affairs resulting from the close connection between the house of Austria and the Holy Roman Empire, for five centuries, is best traced under GERMANY, which see. Here, the internal affairs alone will be touched upon, and the history may be summed up in the history of a family, the Hapsburgs, that, starting with small territorial possessions in the Swabian mountains, brought under its sway by conquest or marriage the heart of Central Europe, from the Carpathians to the Alps and from the Vistula to the Danube and the Adriatic Sea. See:

(a) For Austria:

Austria-Hungary
 Bohemia
 Dalmatia
 Styria
 Moravia
 Galicia
 Tyrol
 Carinthia
 Carniola
 Babenberg
 Ottokar II
 Hapsburg
 Rudolph I
 Albert II
 Maximilian I
 Charles V
 Ferdinand I, II
 Maximilian II
 Thirty Years' War
 Succession Wars (*Spanish*)
 Eugène, Prince
 Joseph II

Leopold II
 Campo-Formio
 Lunéville
 Pressburg
 Vienna, Congress of
 Metternich
 Francis II
 Francis Joseph I
 Windischgrätz
 Radetzky
 Lombardy
 Seven Weeks' War
 Ausgleich
 Triple Alliance
 War in Europe

(b) For Hungary:

Hungary
 Arpad
 Báthory
 Louis I, II
 Sigismund
 Hunyady, János
 Matthias Corvinus
 Mohács
 Zápolya
 Tökölyi
 John III, Sobieski
 Rákóczy
 Deák, Ferencz
 Batthyányi
 Kossuth
 Bem
 Dembinski
 Görgey
 Mészáros
 Klapka
 Haynau
 Tisza

(b) For the Historians:

Arneth, A. R.
 Fessler, I. A.
 Gindely, A.
 Hormayr, J.

Krones, F.
 Mailáth, J.
 Zeissberg, H.
 Wolf, Adam

5. THE IBERIAN PENINSULA.

One of the richest regions of the Roman Empire, Hispania, was wrested from the Romans by successive waves of barbarian invaders in the fifth century of our era. The Christian Gothic kingdom was overthrown by the Arabs, who developed in the peninsula a civilization that was long the highest in Europe. The remnants of the Christian inhabitants rallied in the northern mountains and a slow but steady process of reconquest was begun, hastened by the dissolution of the Arab Caliphate, retarded by strife among the various Christian kingdoms, completed before the end of the fifteenth century, when the greater part of the peninsula had been brought under one crown. Portugal alone preserved its independence of Castile. Enriched by the wealth of a newly discovered world and her Lowland possessions, Spain, in the sixteenth century, plays the leading rôle in European affairs and then enters on a course of political and economic decline which has continued to the present day. Portugal and Great Britain have been friends since the beginning of the eighteenth century. See:

(a) For Spain:

Spain
 Iberians
 Phœnicia
 Carthage
 Hispania
 Lusitania

Goths
 Suevi
 Roderick
 Moors
 Tarik
 Omniads
 Cordova
 Mohammedan Art
 Navarre
 Asturias
 León
 Castile
 Aragon
 Almoravides
 Almohades
 Granada
 Boabdil
 Ferdinand V of Castile
 Isabella I, II
 Ximenes
 Inquisition
 Cortes
 Fuero
 Padilla, Juan
 Alcántara
 Calatrava
 Gonsalvo de Cordova
 Philip II, III, IV
 Armada
 Charles, II, IV
 Succession Wars (*Spanish*)
 Alberoni
 Farnese
 Godoy
 Peninsular War
 Ferdinand VII
 Carlos, Don
 Maria Christina
 Espartero
 Narváez
 Prim
 O'Donnell
 Castelar
 Serrano

Amadeus I
 Alfonso XII, XIII
 Cánovas del Castillo
 Sagasta
 Silvela
 Spanish-American War

(b) For Portugal:

Portugal
 Alfonso I, V
 Diniz
 John I, III
 Henry the Navigator
 Manuel the Great
 Gama, Vasco da
 Almeida
 Albuquerque
 Braganza, House of
 Methuen Treaty
 Pombal
 Peninsular War
 Miguel, Dom
 Pedro, Dom
 Saldanha
 Charles I
 Brazil
 Manuel I, II
 War in Europe

(c) For the Historians, see:

Barros, J. de
 Coxe, W.
 Dozy, R.
 Gayangos
 Lafuente, M.
 Lea, H. C.
 Llorente, J. A.
 Mariana, J.
 Prescott, W. H.
 Robertson, W.
 Zurita Y. Castro

6. ITALY.

The fall of the Western Empire was followed by a struggle between the

Goths and the Byzantines for the possession of Italy. The latter held the south while the north passed from the Goths to the Lombards and the Franks. Constituted with Germany into a shadowy Holy Roman Empire, Italy enters upon a period of utter disunion with the Papal power established in the centre of the peninsula, the north parceled out into independent principalities and republics, the south ruled by Normans, Saracens, French, and Spaniards. The Italian cities rise to great prosperity after the Crusades and become the cradle of the Renaissance. The state of political disintegration continues till the later part of the nineteenth century and Italy suffers from internal strife and foreign domination, Spain and Austria playing the master in the greater part of the peninsula. Union comes to the country from the house of Savoy, whose power, spreading over Sardinia and Piedmont, after a contest with Austria, the Papacy, and Spain, spreads over the entire peninsula. Early Italian history is best studied in the story of separate states and celebrated families. See:

Rome
 Venice
 Florence
 Milan
 Genoa
 Pisa
 Lucca
 Verona
 Bologna
 Ravenna
 Ferrara
 Naples
 Papal States
 Two Sicilies, Kingdom of
 Sicily

Foscari
 Falieri
 Malatesta
 Medici
 Visconti
 Colonna
 Orsini
 Este
 Borgia
 Theodoric the Great
 Belisarius
 Narses
 Lombards
 Saracens
 Normans
 Guiscard
 Crusade
 Renaissance
 Charles VIII of France
 Sforza
 Condottieri
 Louis XII of France
 Ferdinand V of Spain
 Julius II (Pope)
 Savoy
 Napoleon I
 Suvaroff
 Nelson
 Murat
 Carbonari
 Holy Alliance
 Victor Emmanuel I, II, III
 Charles Albert
 Mazzini
 Young Italy
 Radetzky
 Manin
 Cavour
 Garibaldi
 Villafranca
 Rattazzi
 Ricasoli
 Crispi
 Rudini

Depretis
Humbert I
Mafia
Turco-Italian War
Salandra
Sonnino
War in Europe

For the Historians:

Amari, M.
Balbo, C.
Botta, C. G.
Burckhardt, J.
Cantù, C.
Cibrario, G. A.
Farini, L. C.
Gallenga, A.
Gregorovius, F.
Hodgkin, T.
Johnston, R. M.
La Farina, G.
Liudprand
Muratori, L. A.
Paulus Diaconus
Sismondi, J. C.
Symonds, J. A.
Villari, P.

7. THE SLAV EMPIRE.

The Slav inhabitants of the plains south of the Finnish lakes received in the ninth century a ruler of Scandinavian stock, whose successors extended their sway to the southern rivers. The Byzantine civilization and religion are introduced. The unity of the country disappears after the tenth century, and its independence is swept away in the thirteenth by Mongol invaders from the east. The power of the Mongols breaks up in the fifteenth century and a new empire is created by the grand princes of Moscow, whose rule is steadily extended to the south and west at the expense of Poland and the Baltic

powers. Peter I brings Russia within the sphere of European politics and gains for his country a predominant place among the northern powers. With the Baltic reached, Russia turns once more to the south and driving the Turks before her, she reaches the Black Sea and seeks to press into the Balkan peninsula. The jealousy of the powers halts her progress and her advance assumes a new direction—eastward and southward in Asia, where the beginnings of her power had been made in the sixteenth century. In her attack on the integrity of the Chinese Empire, she finds a formidable rival in Japan. Internally, after Peter's time, a struggle goes on between the Eastern and Western civilization, which, at the beginning of the twentieth century, finds Russia still a despotism. Poland, at one time the greatest power in central Europe, fell through disunion and its territory was absorbed by Austria, Prussia, and, to the largest extent, by Russia. See:

(a) For Russia:

Russia
Slavs
Varangians
Rurik
Novgorod
Kiev
Vladimir
Tchernigov
Batu Khan
Alexander Nevski
Moscow
Kiptchak
Ivan III, the Great
Ivan IV, the Terrible
Godunoff, Boris
Demetrius

Romanoff, House of
 Peter I, the Great
 Streltsi
 Charles XII of Sweden
 Anna Ivanovna
 Dolgoruki
 Golitzin
 Biron
 Anna Karlovna
 Elizabeth Petrovna
 Catharine II
 Poland
 Armed Neutrality
 Paul I
 Alexander I
 Tilsit
 Holy Alliance
 Nicholas I
 Crimean War
 Alexander II
 Serf
 Nihilism
 Russo-Turkish War
 Berlin, Congress of
 Loris-Melikoff
 Alexander III
 Ignatieff
 Anti-Semitism
 Nicholas II
 Finland
 Siberia
 Manchuria
 Russo-Japanese War
 Goremykin
 Nicholas (Nikolai Nikolaievitch)
 War in Europe

(b) For Poland:

Poland
 Lithuania
 Teutonic Knights
 Casimir III, the Great
 Jagellons
 Casimir IV

Sigismund the Great
 Ukraine
 Cossacks
 Chmielnicki
 Thorn
 John III, Sobieski
 Succession Wars (*Polish*)
 Stanislas Leszczynski
 Augustus II
 Catharine II
 Kosciuszko
 Chlopicki
 Bem
 Dembinski
 Panslavism
 Aksakoff, I. S.
 War in Europe

For the Historians:

- (a) Bestuzheff-Ryumin, K. N.
 Brückner, A.
 Karamzin, N. M.
 Kostomaroff, N. I.
 Pogodin, M. P.
 Rambaud, A. N.
 Solovieff
- (b) Chodzko, L. J.
 Lelewel, J.
 Niemcewicz, J. U.

8. THE BALKAN PENINSULA.

The Byzantine Empire, successor to the Roman Empire in the eastern Mediterranean, after a thousand years' existence, fell before the Turks, whose power, spreading northward beyond the Danube, extended over Hungary and threatened the Austrian dominions. The rapid decline of the Turks begins with the eighteenth century and has continued to the present day, resulting in the restriction of the Ottoman power to but a fraction of its once vast territories. Russia and Austria have stead-

ily pressed the Turkish power backward, and only the jealousy of the Western powers, England primarily, has preserved the integrity of the Empire. Part of the territory wrested from Turkey has been erected into independent Christian States. In 1908 the Young Turk movement overthrew the old order of things and established a constitutional government. In the Great War Turkey divorced herself from England and cast in her lot with the Teutonic allies. See:

(a) Turkey

Eastern Question
Othman
Amurath I
Janizaries
Bajazet I
Amurath II
Mohammed I
Mohammed II
Mohammed III
Mohammed IV
Mohammed V
Selim I
Solyman
Lepanto
Kiuprili
Kara Mustapha
Eugène, Prince
Mahmud II
Mehemet Ali
Crimean War
Abd ul-Aziz
Abd ul-Hamid
Russo-Turkish War
Berlin, Congress of
Greece
Crete
Armenia
Albania
Ali Pasha
Macedonia

Adrianople
Constantinople
Abd ul-Medjid
Turco-Italian War
Balkan War
War in Europe

(b) Greece

Hetææ
Coray
Ypsilanti
Mavrocordatos
Miaulis
Kanaris
Bozzaris
Kolokotronis
Capo d'Istria
Navarino
Otto I
George I
Trikoupis
Delyannis
Trikoupis, C.
Constantine I
Balkan War
Venizelos
Zaimis
War in Europe

(c) Servia

Czerny George
Obrenovitch
Alexander Karageorgevitch
Milan I
Natalie
Ristic
Alexander I
Peter I, Karageorgevitch
Skupshtina
Bosnia
Herzegovina
Berlin, Congress of
Panslavism
Balkan War
Pashich

War in Europe
Mijatovich

(d) Bulgaria

Bulgars
Russo-Turkish War
Alexander I
Ferdinand I
Stambuloff
Berlin, Congress of
Balkan War
Panslavism
War in Europe

(e) Rumania

Moldavia
Wallachia
Kantemir
Hospodar
Fanariots
Ypsilanti
Ghika
Russo-Turkish War
Jews
Berlin, Congress of
Bratianu
Charles I
Balkan War
Panslavism
Ferdinand (Rumania)
War in Europe

(f) Bosnia

(g) Herzegovina . .

(h) Montenegro

Berlin, Congress of
Danilo I
Panslavism
Balkan War
Scutari
Nicholas I
War in Europe

(i) Albania

Balkan War
Essad Toptani

William of Wied
War in Europe

For the Historians:

Creasy, E. S. (Turkish)
Hammer-Purgstall (Turkish)
Lambros (Greek)
Trikoupis, S. (Greek)
Ranke, L. von. (Servian)
Mijatovich, C. (Servian)
Jirecek, K. (Bulgarian)
Iorga, N. (Rumanian)

8. THE MINOR NATIONS OF EUROPE.

(a) Denmark

Margaret
Christian VII
Christian VIII
Christian IX
Christian X
Schleswig-Holstein
Frederick III
Frederick V
Frederick VI
Frederick VII
Frederick VIII
Norway
Oscar II
War in Europe

(b) Sweden

Finland
Eric
Kalmar
Sture
Gustavus Vasa
Charles IX
Gustavus Adolphus
Oxenstierna
Christina
Charles XII
Gustavus I-V
Caps and Hats
Charles XIV, John

Oscar I, II
 Adolphus Frederick
 War in Europe

(c) Norway

Normans
 Harald Haarfagr
 Iceland
 Haakon
 Denmark
 Christian II, IV, VII
 Frederick I, II
 Haakon VII
 Olaf
 War in Europe

(d) Netherlands

Burgundy
 Granvella
 Margaret of Parma
 William the Silent
 Egmont
 Hoorne
 Alva
 Farnese, Alexander
 Barneveldt
 Maurice of Nassau
 Dort, Synod of
 De Witt
 Stadtholder
 William III
 Louis XIV
 Wilhelmina
 War in Europe

(e) Belgium

Flanders
 Brabant
 Walloons
 Netherlands
 Ostend Company
 Frère-Orban
 Rogier
 Leopold I, II
 Albert I
 Vandervelde

Liège
 Namur
 Ostend
 War in Europe

(f) Switzerland

Helvetii
 Alemannia
 Burgundy
 Hapsburg
 Tell, William
 Morgarten
 Sempach
 Winkelried
 Morat
 Zurich
 Hofer, Andreas
 Sonderbund
 War in Europe

For the Historians:

Blok, P. J. (Dutch)
 Fryxell, A. (Swedish)
 Geijer, E. (Swedish)
 Juste, T. (Belgian)
 Merle D'Aubigné (Swiss)
 Motley, J. L. (Dutch)
 Munch, P. A. (Norwegian)
 Nielson, Y. (Norwegian)
 Steenstrup, J. C. H. R. (Danish)

10. SOUTH AMERICA AND MEXICO.

Beginning with Mexico in 1519, the great regions of Central and South America were rapidly brought under Spanish rule, Portugal, however, held sway in Brazil, and in Guiana small portions fell to other European nations. The harsh Spanish rule led to bitter but unsuccessful uprisings among the Indian tribes of Peru and Chile. The first quarter of the nineteenth century witnessed the successful revolt of the Spanish dependencies, aided in their struggle by the decidedly

friendly attitude of Great Britain and the United States, of whom the latter now assumes the rôle, largely, of protector over the newly established republics. A decided inaptitude for self-government is evinced by these, and chronic disorder checks national development. Chile, Argentina, and Mexico are, however, prominent exceptions. Brazil, after living tranquilly as an independent empire, enters upon the troubled career of republican politics towards the end of the nineteenth century. The influence of the United States in South America becomes an important factor with the completion of the work of building the Panama Canal. See:

Mexico
 Mexican Archæology
 Montezuma
 Cortés
 Mendoza, Antonio de
 Hidalgo, Miguel
 Morélos
 Itúrbide
 Guerrero, Vicente
 Santa Anna
 Mexican War
 Comonfort
 Juarez
 Miramon
 Almonte
 Maximilian
 Lerdo de Tejada
 Diaz, Porfirio
 Villa
 Huerta
 Madero
 Zapata
 Central America
 Guatemala
 Nicaragua
 Zelaya

Honduras
 Salvador
 Costa Rica
 Morazán
 Carrera, Rafael
 Walker, William
 Peru
 Huayna Capac
 Pizarro, Francisco
 Pizarro, Gonzalo
 Almagro
 San Martin, José de
 Prado, M. I.
 Bolivia
 Chile
 Araucania
 Valdivia, Pedro de
 Carrera, José Miguel de
 O'Higgins, Bernardo
 San Martin, José de
 Balmaceda, José Manuel
 Argentina
 Rosas, Juan Manuel
 Urquiza, Justo José
 Mitre, Bartolomé
 Sarmiento, Domingo F.
 Uruguay
 Gauchos
 Artigas, Fernando José
 Flores, Venancio
 Paraguay
 Guaraní
 Francia, José Gaspar
 Lopez, Francisco Solano
 Colombia
 Ecuador
 Venezuela
 Castro, C.
 Miranda, F.
 Bolivar, Simon
 Paez, José Antonio
 Brazil
 Pedro I, II
 Fonseca, Deodoro da

For the Historians and Investigators,
see:

Ixtlilxochitl

Prescott

Bancroft, H. H.

Bandelier, A. F. A.

Charnay, C. J. D.

Squier, E. G.

Markham, C. R.

Vicuña-Mackenna, Benjamin

Dupleix

Clive

East India Company

Hastings, Warren

Cornwallis, Lord

Wellesley, Marquis of

Nana Sahib

For the Religions of India, see Chapter
on RELIGION.

11. THE FAR EAST.

(1) INDIA. The history of India may be divided into three periods, that of the early Hindu domination, the period of Mohammedan rule, and the period of European supremacy. See:

(a) For the Peoples:

India

Indian Peoples

Aryan

Dravidians

Tamils

Telugus

Kanarese

Malayalim

(b) For the History:

India

Bimbisara

Sandrocottus

Ghaznivides

Timur

Baber

Akbar

Shah Jehan

Aurungzebe

Nadir Shah

Ahmed Shah

Gama, Vasco da

Albuquerque

Almeida

Pondicherry

Goa

(2) CHINA. China presents the spectacle of a nation which, having attained a high degree of civilization at a time when Europe was still barbarian, has been content to remain quiescent while the world has moved forward. In spite of its vast latent strength, it seems destined to become the prey of European ambitions, unless the example of its kindred nation, Japan, should lead it to recognize the civilization of the West, and to observe the preponderant rôle that should be its own in the Orient. See:

China

Fuh-hi

She Hwang-Ti

Han

Genghis Khan

Kublai Khan

Ta Ts'ing

K'ang-hi

Hung-siu-ts'uen

Gordon, Charles George

Li Hung Chang

Kwang-Sü

Far Eastern Question

Tze-hsi

• Yuan Shih-kai

For the Philosophy and Religions of
China, see Chapter on RELIGION.

(3) JAPAN. Among the nations of the East, Japan stands forth as an amazing exception to Eastern immobil-

ity. The political balance in the Pacific has been quite upset by the appearance of this new power, which, in less than four decades, has passed from feudalism and Oriental seclusion to a constitutional government and the skilful utilization of the sciences and wisdom of the West. Japan's triumph over China in 1894-95 first marked strength; its magnificent struggle against Russian aggression in China and its participation in the Great War raised the possibility of a quite unexpected development in the relations between Europeans and Mongolians.

See:

Japan
 Jimmu Tennō
 Taira
 Samurai
 Minamoto
 Fujiwara
 Yoritomo
 Ashikaga
 Daimio
 Nobunaga
 Hideyoshi
 Iyeyasū
 Tokugawa
 Iyemitsu
 Perry, M. C.
 Kéiki
 Mutsuhito
 Arisugawa
 II Kamon no Kami
 Itagaki, Taisūke
 Ito, Hirobumi
 Iwákura, Tomomi
 Okubo, Toshinichi
 Okuma, Shigenobu
 Soyeshima Tanéomi
 Yamagata Aritomo
 Kato
 Yoshihito
 War in Europe

See also:

Nichiren
 Arai Hakuseki (1657—)
 Motoori Norinaya (1730—)
 Hokusai (1760—)
 Fukuzawa, Yukichi
 Kido, Takayoshi

For the Authorities, see:

Abeel, D.
 Beal, S.
 Biot, E. C.
 Griffis, W. E.
 Hirth, F.
 Julien, S. A.
 Legge, J.
 Morrison, R.

12. THE UNITED STATES.

Norse explorations in North America, about the year 1000, led to no result, and Europe, before the time of Columbus, had no knowledge of a world beyond the Atlantic. The discovery, in 1492, was followed by a period of exploration, in which Spanish, French, English, and Dutch participated. Settlement follows, and poverty and religious persecution in Great Britain stretches a chain of English speaking colonies along the eastern coast of what is now the United States. Swedes and Dutch give way in time, and with Spain restricted to Florida, England enters into a struggle for possession of the interior with France, whose rule has meanwhile been extended over the basins of the St. Lawrence, the Mississippi, and the Great Lakes. England triumphs, and brings under her authority the disputed territory east of the Mississippi. See:

(a) The Discoverers:

Ericson

Vinland
 Madog
 Columbus
 Vespuccius
 Cabot
 Cortereal
 Verrazano
 Ponce de Leon
 Ayllon
 Narváez, P. de
 Nuñez Cabeça
 De Soto
 Coronado
 Drake
 Frobisher
 Gilbert, Sir Humphrey
 Gosnold
 Smith, John
 Norumbega
 Cartier
 Champlain
 Hudson
 Nicollet
 Joliet
 Marquette
 La Salle
 Hennepin
 Tonty
 Lewis, Meriwether
 Clark, William
 Pike
 Long, S. H.
 Bonneville
 Catlin
 Whitney, J. D.
 Hayden
 Powell, J. W.

Yeardley
 Berkeley
 Bacon
 Bradford, William
 Standish
 Endecott
 Winthrop
 Minuit, Peter
 Kieft
 Stuyvesant
 Hooker, T.
 Davenport, J.
 Williams, Roger
 Hutchinson, Anne
 Baltimore, Barons of
 Claiborne
 Friends
 Penn
 Oglethorpe

(c) For the Struggle with the French:

King William's War
 Queen Anne's War
 King George's War
 French and Indian War
 Pepperrell, Sir William
 Louisburg
 Albany Convention
 Braddock
 Amherst
 Abercromby
 Loudoun
 Wolfe, James
 Montcalm
 Pontiac
 Paris, Treaties of

(b) The Settlers:

See under the names of the thirteen original colonies; also:

London Company
 Plymouth Company
 Jamestown

England's triumph over France is followed almost immediately by the irreparable loss of the thirteen colonies. The injustice of Parliamentary taxation stirs the colonists to resistance, and the memory of their triumph over the French lends them courage for the struggle. See:

(a) The Pre-revolutionary Period:

Navigation Laws
 Assistance, Writ of
 Otis, James
 Stamp Act
 Sons of Liberty
 Boston Massacre
 Boston Tea Party
 Boston Port Bill
 Quebec Act
 Adams, Samuel
 Hancock, John

Marion
 Sumter
 Pickens
 Lee, Richard Henry
 Jones, Paul
 Wayne, Anthony
 Clark, George Rogers
 Lafayette
 Rochambeau
 Grasse, Count de
 Steuben
 Kalb, Baron de
 Kosciuszko
 Pulaski
 Howe, Lord
 Clinton
 Burgoyne
 Cornwallis
 Tarleton
 Jefferson
 Franklin, B.
 Livingston, R. R.
 Deane, Silas
 Sherman, Roger
 Morris, Robert
 Declaration of Independence

(b) The Revolution: (1) The Battles:

Lexington
 Concord
 Bunker Hill
 Long Island
 Trenton
 Princeton
 Brandywine
 Germantown
 Oriskany
 Bennington
 Saratoga
 Monmouth
 Camden
 Cowpens
 Guilford Court House
 Eutaw Springs
 Yorktown

(2) The Men:

Warren
 Putnam
 Washington
 Montgomery
 Arnold
 Lee, Charles
 Gates
 Greene
 Conway
 Stark
 Herkimer
 Morgan

The thirteen colonies, having vindicated their independence in a protracted war, are impelled for the defence of their now won liberties, and the furtherance of their common welfare, to organize themselves into a federal republic with a written constitution, in nature essentially a compromise between the ideas of local liberty and efficiency of the central authority. The Liberator of the nation is also its first executive. His death is followed by a struggle between the two constitutional principles. The advocates of "strict construction" triumph, and, in the person of Thomas Jefferson, the Republican-Democratic Party assumes power to hold it uninterruptedly for forty years. The

boundaries of the Union are extended by the admission of new States, and the national territory is enormously increased by the acquisition of Louisiana and Florida. Party differences disappear, for a while, after a second war with Great Britain, but a new cause of dissension appears in the form of the slavery question, which replaces constitutional politics by sectional. See:

(a) The Formation of the Union:

Constitution of the United States
Shays's Rebellion
Hamilton
Madison
Jay
Pinckney, C. C.
Wilson, James
Randolph, Edmund
Paterson, William
Henry, Patrick
Northwest Territory

(b) The Era of Party Strife:

Federalists
Anti-federalists
Federalist, The
Gallatin, A.
Marshall, John
Burr
Genet
Jay Treaty
Whisky Rebellion
X. Y. Z. Correspondence
Alien and Sedition Laws
Virginia and Kentucky Resolutions
Louisiana Purchase
Lewis and Clark Expedition
Continental System
Orders in Council
Embargo
Chesapeake, The

Constitution, The
Erie, Battle of Lake
Thames, Battle of the
Chippewa
Lundy's Lane
New Orleans, Battle of
Tippecanoe
Hull, Isaac
Hull, William
Lawrence
Perry
Macdonough
Hartford Convention
Cushing, Caleb
Ghent, Treaty of
Missouri Compromise
Monroe, James
Monroe Doctrine

The Democratic Party in the course of time did not fail to adopt many of the principles of the old Federalists, among them notably the national encouragement of internal improvements and the creation of a Government bank. The tendency on the part of a faction to lay stress on these functions of the Government led to the dissolution of the Democratic Party. The Whigs now appear, historically the successors of the Federalists and the predecessors of the Republican Party. The hierarchic succession of presidents ends in 1828, and the Western Democracy triumphs in the person of Andrew Jackson. Sectional feeling, fostered by growing economic differences between North and South, is intensified by the rise in the North of an outspoken spirit of opposition to the institution of slavery. The two political parties for a time eagerly ignore the issue, and Southern statesmen, armed with the threat of a disruption of the Union, succeed in coercing the conservatives in the North.

Territorial expansion, however, forces the slavery question into the foreground; the Whig Party, unwilling directly to challenge the issue, is succeeded by the Republican Party, which will. The Democratic Party is broken in two. With the triumph of the anti-slavery party in 1860, the South secedes from the Union. See:

(a) The Formation of Parties and the Rise of the Slavery Question:

Democratic Party
 Adams, John Quincy
 Crawford, William
 Jackson, Andrew
 Caucus
 Whig Party
 Clay, Henry
 Cumberland Road
 Tariff
 Nullification
 McDuffie
 Calhoun, John C.
 Hayne, Robert
 Webster
 Abolitionists
 Garrison, William Lloyd
 Phillips, Wendell
 Lovejoy, Elijah
 Lundy, Benjamin
 Van Buren
 Marcy, W. L.
 Harrison, William Henry
 Tyler
 Webster-Ashburton Treaty
 Northeast Boundary Dispute
 Polk
 Texas
 Houston, Samuel
 Oregon
 Northwest Boundary Dispute
 Mexican War
 Wilmot Proviso
 Scott, Winfield

Taylor, Zachary
 Fillmore
 Cass
 Clayton-Bulwer Treaty

(b) The Final Struggle over Slavery:

Free Soil Party
 Compromise Measures of 1850
 Fugitive Slave Law
 Seward
 Sumner
 Davis, Jefferson
 Underground Railroad
 Pierce, Franklin
 Kansas-Nebraska Bill
 Popular Sovereignty
 Thayer, Eli
 Republican Party
 Douglas, Stephen A.
 Taney, Roger
 Dred Scott Case
 Buchanan, James
 Brown, John
 Lincoln, Abraham
 Breckinridge, J. C.
 Bell, John
 Constitutional Union Party

(c) The Civil War:

Civil War in America
 Confederate States of America
 Stephens, Alexander
 Benjamin, Judah P.
 Toombs, Robert

1. The Battles:

I. In the East:

Fort Sumter
 Big Bethel
 Bull Run
 Ball's Bluff
 Williamsburg
 Seven Pines
 Mechanicsville

Gaines's Mill
 Savage's Station
 Frazier's Farm
 Malvern Hill
 Bull Run (second)
 Antietam
 Fredericksburg
 Chancellorsville
 Gettysburg

II. In the West:

Wilson's Creek
 Paducah
 Belmont
 Fort Henry and Fort Donelson
 Pea Ridge
 Shiloh
 Corinth
 Iuka
 Island No. 10
 New Orleans
 Perryville
 Stone River
 Vicksburg
 Chickamauga
 Chattanooga
 Mobile Bay

III. The Final Campaigns:

Dalton
 Kenesaw Mountain
 Nashville
 Fort McAllister
 Bentonville
 Wilderness
 Spottsylvania Court House
 Cold Harbor
 Monocacy
 Winchester
 Cedar Creek
 Five Forks
 Petersburg
 Appomatox Court House

2. The Men:

Grant
 Sherman
 Sheridan
 McClellan
 Meade
 Thomas
 Burnside
 Halleck
 Hooker
 Rosecrans
 Buell
 Hancock
 Pope
 Lyon
 Foote
 Farragut
 Lee
 Jackson
 Johnston
 Johnston
 Longstreet
 Beauregard
 Bragg
 Hood
 Early

(d) Emancipation Declaration

Draft Riots

Four years of civil war established the principle that the United States, once perhaps a federation, is now a nation. Slavery is abolished and a partisan Congress, under the stress of circumstances, gives the ballot to the liberated bondsmen. Reconstructed, the Southern States devote themselves to the task of rebuilding their wasted fortunes on old ruins and new conditions. The South recognizes the lesson of the war in its bearing on the nature of our Government, but refuses to recognize the capacity for political and social equality in the negro, and in the last

years of the nineteenth century enters upon a deliberate policy of negro disfranchisement through State legislation. In the North and West, the era is one of extraordinary material growth, and political questions of the time are largely economic—currency, tariff, labor, and monopoly. With the acquisition of the Spanish possessions in the Pacific, and the assumption of the task of building the interoceanic Panama Canal, the United States begins its career as a world power. See:

(a) The Restored Union:

Johnson, Andrew
 Reconstruction
 Freedman's Bureau
 Carpet Baggers
 Ku-Klux Klan
 Knights of the Golden Circle
 Force Bill
 Tenure of Office Act
 Stanton
 Alaska
 Chase, S. P.
 Stevens, T.

(b) From the Close of the Civil War Period:

Grant, U. S.
 Alabama Claims
 Grange
 Credit Mobilier of America
 Virginus Massacre
 Whisky Ring
 Electoral Commission
 Custer
 Modoc
 Sioux
 Indians
 Centennial Exhibition

Hayes, R. B.
 Tilden

Strikes and Lockouts
 Bland, R. P.
 Greenbacks
 Greely, H.

Garfield, J. A.

Arthur, C. A.

Harrison, B.

Bering Sea Controversy
 Tariff
 Hawaiian Islands

Cleveland, G.

Venezuela
 World's Columbian Exposition

McKinley, Wm.

Blaine, J. G.
 Reed, T. B.
 Spanish-American War
 Cuba
 Philippines
 Porto Rico
 Trusts
 Pan-American Exhibition.

Roosevelt, T.

Hay-Pauncefote Treaty
 Panama Canal
 Root, E.
 Louisiana Purchase Exposition
 Russo-Japanese War
 Hughes, C. E.
 Trusts
 Lodge, H. C.
 Poindexter, Miles

Taft, Wm. H.

Pugo
 Knox, P. C.
 Conservation
 Trusts
 Tariff
 Lorimer, Wm.
 Aldrich, N. W.

Mexico, *History*

La Follette, R. M.

Cummins, A. B.

Penrose, B.

Borah, Wm.

Wilson, W.

Bryan, Wm. J.

Parker, A. B.

Underwood, O.

Brandeis, L. D.

McAdoo, Wm. G.

Daniels, J.

Reserve Bank, Federal

Mexico, *History*

Tariff

Mann, J. P.

O'Gorman, J. A.

Newlands, F. G.

Kern, J. W.

Owen, R. L.

Gore, T. P.

Smith, Hoke

Stone, Wm.

War in Europe

Party Names

Money

Coinage

Labor Organizations

Arbitration

Railways (Interstate Commerce
Act)

Trusts

Tariff

For the Historians:

Adams, C. F.

Adams, H.

Bancroft, G.

Bancroft, H. H.

Beard, C. A.

Brodhead, J. R.

Bryce, James

Burgess, J. W.

Channing, F.

Coffin, C. C.

Curtis, G. T.

Dodge, T.

Doyle, J. A.

Dunning, W. A.

Fiske, J.

Frothingham, R.

Gayarré, C.

Harris, H.

Hart, A. B.

Higginson, T. W.

Hildreth, R.

Holst, H. E. von

Johnston, A.

Lodge, H. C.

Lossing, B.

McMaster, J. B.

Palfrey, J. G.

Parkman, F.

Peter Martyr

Rhodes, J. F.

Robinson, J. H.

Ropes, J. C.

Schouler, J.

Shea, J. G.

Sloane, W. M.

Sparks, J.

Thorpe, F. N.

Thwaites, R. G.

Wilson, W.

Winsor, J.

Chapter 2. Law and Political Science

NATIONAL or Municipal law is commonly divided into two general classifications, Substantive Law, and Adjective or Remedial Law. Substantive Law prescribes and defines the normal relations of social and political life, that is, legal rights, obligations, and privileges, as distinguished from violations of the normal, legal order. (See Substantive Law.) Adjective or Remedial Law deals with abnormal conditions, such as crimes, and with the methods of enforcement of legal rights. Both of these classifications are severally divided into Public Law and Private Law. The title, Public Law, is applied to those subjects which have to do with the relations of individuals to the various branches of government. Private Law includes the rules governing the relations of individuals to each other, and their rights in and over property. While, for some purposes, Substantive and Remedial Law are so closely connected that a complete knowledge of one is not possible without an acquaintance with the other, yet, in general, it may be said that, for practical purposes, the average layman is concerned chiefly with the rules of Substantive Law, except, perhaps, Public Remedial Law—the Law of Crimes. For example, it is quite necessary that a person in business be somewhat familiar with the ordinary principles of the Law of Contracts, but it is not necessary that he should know how to proceed in law to obtain redress for the breach of a contract.

International Law is distinguished from Municipal Law, in that the former deals with the relations of nations with each other, and such rules of law as will be recognized by nations in dealing with the citizens of each other, while the latter deals with the relations of one nation to its citizens, and the relations of the citizens with each other. International Law is administered, generally, in the various courts of each nation when applicable, but the refusal of a nation to recognize any of its principles could only be met by a declaration of war on the part of the aggrieved nation or nations, whereas the sovereign power of a nation sanctions and enforces Municipal or National Law. Therefore, to avoid confusion, topics in International Law are placed in a separate classification.

For a General Discussion of the Nature and Purposes of Law, see:

Law	Municipal Law
Jurisprudence	Mercantile Law
Substantive Law	Military Law
International Law	

A. Substantive Law

I. PUBLIC SUBSTANTIVE LAW.

This branch of substantive law is commonly divided into two general

classifications, CONSTITUTIONAL and ADMINISTRATIVE LAW. Constitutional law deals with the nature and powers of the Government, and correlatively with

the rights and privileges of citizens with reference to the Government. The name, **ADMINISTRATIVE LAW**, is applied to that portion which controls and regulates the enforcement of the will of the Government, as expressed by constitutions, statutes, etc.

1. CONSTITUTIONAL LAW :

Constitution
 Constitutional Law
 Constitution of the United States
 Magna Charta
 Amendment
 Federal Government
 Police Power
 Veto
 Eminent Domain
 Bill of Rights
 Civil Rights Bill
 Bill of Attainder
 Sovereignty
 State
 Ex post facto
 Retroactive
 Due Process of Law
 Congress
 Legislature
 Legislation
 Conflict of Laws
 Act
 Act of Parliament
 Repeal
 Citizen
 Alien
 Naturalization
 Allegiance
 Domicile
 Alien and Sedition Acts
 Expatriation
 Expulsion
 Liberty of Individual
 Liberty, Religious
 Emancipation

Reprieve
 Territories
 Consolidation Acts
 Restraint of Trade
 Interstate Commerce Act
 Granger Cases
 Concurrent Jurisdiction
 Original Package
 Income Tax
 Inheritance Tax
 Dartmouth College Case
 Slaughter-House Cases
 Dred Scott Case
 Fugitive Slave Law
 Homestead Laws
 Poor Laws
 Tenure of Office Act
 Legal Tender Cases
 Debt, Public
 Convention
 Election
 Vote
 Fishing Laws
 Franchise

2. ADMINISTRATIVE LAW :

Administrative Law
 Executive Department
 State, Department of
 Diplomacy
 High Commission
 Commission
 Commissioner
 Municipality
 Municipal Government
 Municipal Law
 Municipal Ownership
 Municipal Reform Acts
 Civil Administration
 Court
 Supreme Court of U. S.
 Courts, Military
 Court Baron
 Court of Session

County Court
 Common Bench
 Probate Court
 Petty Sessions
 District Court
 Sheriff's Court
 Ecclesiastical Court
 King's Bench
 Cassation, Court of
 Claims, Court of
 Instance, Court of
 Inns of Chancery
 Inns of Court
 Ordinance
 By-law
 Charter
 Building Acts
 Cemetery Laws
 Factor's Acts
 Intoxicating Liquors
 Grand Jury
 Justice, Lord
 Sheriff
 Justice of the Peace
 Marshal
 Coroner
 Assessors
 Auditor
 Alderman
 Attorney-General
 Surrogate
 Judge-Advocate
 Judge
 Referee
 Justice
 Justice, Department of
 Justice of the Peace
 Appointment

II. PRIVATE SUBSTANTIVE LAW

For convenience this portion of the substantive law is divided into two classifications, the Law of Persons and the Law of Property.

1. LAW OF PERSONS:

In law, both natural persons and those creations of the law, such as corporations, known as legal entities, or juristic persons, are classed together in the Law of Persons, as the same general principles apply to them. Under the title **NATURAL PERSONS**, are grouped titles dealing with the peculiar privileges and disabilities of married women, infants, and persons of unsound mind. Topics dealing with the family relation are for convenience grouped together.

(a) *Natural Persons:*

I. Persons Exercising Incomplete or Special Rights:

Infant
 Minor
 Legitimacy
 Apprentice
 Disability
 Married Women
 Feme Coverte
 Coverture
 Insanity
 Lucid Interval
 Capacity

(b) *Family Relations:*

Husband and Wife
 Settlement
 Marriage
 Divorce
 Alimony
 Adultery
 Separation
 Abandonment
 Paraphernalia
 Community of Property
 Emancipation
 Separate Estate

Parent and Child

Adoption

Bastard

Ancestor

Affinity

Consanguinity

Domicile

Guardian

(c) Juristic Persons:

Company

Corporation

Ultra Vires

De Facto

Charitable Trusts

Ecclesiastical Corporation

Joint Stock Company

Limited Companies

Limited Liability

Regulated Companies

Stock Company

Dividend

Director

Trust

Trust Fund Doctrine

der the title, SUCCESSION AND INHERITANCE.

(a) *Real Property*:

i. Nature of Real Property:

Real Property

Real Estate

Hereditament

Tenement

Mines and Mining

Feudalism

Fee

Fief

Feud

Feu

Accession

ii. Systems of Tenure:

Tenure

Seisin

Manor

Socage

Frankalmoigne

Gavelkind

Ground-Annual

Demesne

Ancient Demesne

Borough English

Burgage Tenure

Tenant Right

Community of Property

Mortmain

Subinfeudation

Sergeanty

Landlord and Tenant

Attornment

Lease

Leasehold

Common, Tenancy in

Tenancy at Sufferance

Tenancy at Will

Rent

Occupancy

Mining Claim

2. LAW OF PROPERTY:

The term property includes everything that is the subject of possession and ownership, whether tangible or intangible. The various kinds of property are naturally divided into two classifications, REAL and PERSONAL. Real Property includes lands, tenements, and hereditaments, and interests therein. Subjects dealing with the disposition and incumbrance of real property *inter vivos* are also placed under this title. Personal Property includes all movable objects of property, commonly known as chattels, and such claims, obligations, and rights of action as are the subject of transfer. Topics treating of the transfer of property, both real and personal, by will or descent, are classed un-

Life Estate
 Conditional Fee
 Remainder
 Reversion
 Freehold
 Dower
 Curtesy
 Entry, Right of
 Entirety
 Equity of Redemption
 Equitable Estate
 Riparian Rights
 Rivers, Navigable and Non-navigable
 Inclosures of Commons
 Use and Occupation
 License
 Pew Rights

iii. Transfer and Incumbrance of Real Property:

Alienation
 Incumbrance
 Bargain and Sale
 Conveyance
 Conveyancing
 Land Transfer, Reform in
 Abstract of Title
 Search of Title
 Deed
 Habendum
 Restrictive Covenants
 Conditional Limitation
 Quit Claim
 Lease and Release
 Demise
 Executory Devise
 Shifting Use
 Entail
 Shelley's Case, Rule in
 Enrollment
 Power of Appointment
 Power
 Ejectment

Eviction
 Adverse Possession
 Common Assurance
 Elegit, Estate by
 Jointure
 Escrow
 Settled Estate
 Tax Sale
 Tax Title
 Cloud on Title
 Perpetuity
 Prescription
 Quit Rent
 Office Found
 Partition
 Mortgage
 Merger
 Tacking of Mortgages
 Mechanic's Lien
 Servitude
 Easement
 Equitable Easement
 Incorporal
 Equitable Mortgage
 Building Loans
 Donis Conditionalibus
 Domesday Book
 Recording Acts
 Recording of Deeds
 Torrens System
 Title, Registration of
 Title Insurance

(b) *Personal Property:*

i. Possession:

Chattel
 Movables
 Confusion
 Treasure-Trove
 Chose in Action
 Fixtures
 Emblements
 Estray
 Good-Will

Finding
Oysters, Law as to
Wreck

ii. Patents, Patent Law :

Letters Patent
Trademark
Trade-name
Copyright
Literary Property
Invention
Caveat

iii. Contracts, Obligations, and Intangible Property Rights :

Contract
Obligation
Covenant
Consideration
Rescission
Discharge
Breach
Subrogation
Abrogation
Suretyship
Pledge
Reward
Guaranty
Gift
Claim
Debt
Creditor
Commercial Law
Debtor
Payment
Chose in Action
Accord and Satisfaction
Assignment
Donation
Joint Ownership
Sale
Bill of Sale
Auction
Market Overt

Caveat Emptor
Delivery
Condition and Conditional
Vendor's Lien
Lien
Bailment
Carrier, Common
Baggage
Bill of Lading
Forwarding
Consignment
Stoppage in Transitu
Joint Adventure
Freight
Negotiable Instruments
Negotiable Paper
Promissory Note
Check
Bill of Exchange
Bank-Bills
Exchequer Bills
Bought and Sold Notes
Specialty
Bond
Stock
Coupon
Credit, Letter of
Warehouse Receipt
Bottomry Bond
Indorsement
Dishonor
Exchange
Interest
Agent
Factor
Partnership
Mercantile Agent
Mercantile Agency
Master and Servant
Joint Liability
Insurance
Life Insurance
Accident Insurance
Wager Policy

Account

Deposit

Voucher

Receipt

Seal

Notary Public

Acknowledgment

Debenture

(c) Succession and Inheritance:

Decedent

Estate

Inheritance

Intestacy

Distribution

Succession ab Intestato

Surveyorship

Primogeniture

Inventory

Administration

Will

Testament

Appraisement

Legacy

Residuary Legacy

Ademption

Advancement

Codicil

Share

Beneficiary

Per Stirpes

Devise

Personal Representative

Executor

Undue Influence

Deathbed, Law of

Heir

Heirloom

Accumulations

Lapse

Posthumous Child

B. Remedial Law

I. PUBLIC REMEDIAL LAW.

This portion of the Adjective, or Remedial, Law deals with crimes, the penalties therefor, and the method of prosecution of accused persons by the State. We shall first take up those topics which define particular crimes, under both statutes and the common law, and then those which deal with the prosecution and punishment of crimes. See:

Adjective Law

1. *Crimes, Misdemeanors, etc.:*

Crime

Criminology

Criminal Law

Misdemeanor

Accessory

Accomplice

Infamy

Felony

Barratry

Blackmail

Blasphemy

Body-Snatching

Bribery

By-Bidding

Burglary

Embezzlement

Robbery

Stolen Goods

Receiving Stolen Goods

Assault and Battery

Security

Security of Person

Manslaughter

Homicide

Murder

Malpractice

Consent

Infanticide
 Arson
 Smuggling
 Counterfeiting
 Subornation of Perjury
 Compounding of Felony
 Suicide
 Misprision
 Treason
 Overt Act
 Malicious Mischief
 Extortion
 Forgery
 Sunday
 Gambling
 Disturbance
 Eavesdropping
 Embracery
 Engrossing
 Forestalling
 Monopoly
 Harboring
 Champerty
 Concealment
 Corrupt Practices
 Simony
 Piracy
 Policy
 Fornication
 Rape
 Incest
 Rescue
 Riot
 Abortion
 False Pretenses
 Common Scold
 Sumptuary Laws
 Trading Stamps
 Habitual Drunkard

Arraignment
 Search
 Bench Warrant
 Search Warrant
 Writ
 Attainder
 Autrefois Acquit
 Benefit of Clergy
 Capital Punishment
 Charge and Specification
 Commitment
 Corporal Punishment
 Corruption of Blood
 Fine
 Forfeiture
 Hard Labor
 Information
 Indictment
 Justification
 Ordeal
 Outlawry
 Civil Death
 Peine Forte et Dure
 Penalty
 Posse Comitatus
 Nolle Prosequi
 Prisoner
 Prosecution
 Prosecutor
 Voir Dire
 Punishment
 Self Defense
 Sentence
 State's Evidence
 Corpus Delicti
 Ne Exeat
 Torture
 Extradition
 Locus Delicti

2. Criminal Procedure and Punishment of Crimes:

Criminal Procedure
 Arrest

II. PRIVATE REMEDIAL LAW.

This division of Remedial Law includes the law of Torts and Civil Practice and Procedure. Torts are

wrongs other than those arising out of contract, for which the injured party has a right of action. A tort action is not assignable and is not strictly a property right, and, therefore, the law of torts is properly considered remedial law. Under the title, Civil Practice and Procedure, are grouped all topics dealing with the enforcement of civil rights of action of a private nature.

1. TORTS, OR CIVIL WRONGS.

- Conversion
- Trespass
- Assault
- Trover
- Fraud
- Fraudulent Conveyance
- Infringement
- Slander of Title
- Defamation
- Slander
- Libel
- Contribution
- Intimidation
- Accident
- Injury
- Misrepresentation
- Nonfeasance
- Nuisance
- Negligence
- Malfeasance
- False Imprisonment
- Malicious Prosecution
- Mayhem
- Pollution of Watercourses
- Criminal Conversation
- Employer's Liability
- Fellow-Servants

2. CIVIL PRACTICE AND PROCEDURE.

In English jurisprudence, three distinct systems of procedure, corresponding and adapted to distinct systems of jurisprudence, were developed respect-

ively by the courts of common law, the courts of chancery, and the courts of admiralty. The common law procedure is much older than the procedure in either equity or admiralty, as practiced by the English courts, the *curia regis*,—which was the forerunner of the English Courts of Exchequer, Common Pleas, and King's Bench, in which the common law procedure was developed,—having been established in the early part of the twelfth century. Procedure in equity is much simpler than procedure at common law. Its essential characteristics are based on the fact that the sole power of that court is to command things to be done, and not directly to transfer or otherwise affect the rights of litigants. Procedure in admiralty was founded upon the Roman law and corresponds in many particulars to the equity system. The embarrassment experienced as a consequence of the technical character of the common law procedure has led to many reforms by legislation.

- Action
- Limitation of Actions
- Civil Action
- Civil Procedure
- Forms of Action
- Admiralty Law
- Equity
- Procedure
- Practice
- Pleading
- Process
- Code
- Code Napoléon
- Service of Papers and Process
- Next Friend
- Parties
- Name
- Plea

Common Counts
Common Forms
Common Plea
Common Recovery
Debt, Action of
Detinue
Assumpsit
Foreclosure
Replevin
Bill in Equity
Real Action
Civil Death
Claim
Lawyer
Attorney
Advocate
Barrister
Counselor
Solicitor
Disbarment
Client
Plaintiff
Defendant
Respondent
Joinder
Writ
Declaration
Confession and Avoidance
Answer
General Issue
Verification
Demurrer
Disclaimer
Defense
Forma Pauperis, In
Cross-Bill
Confession of Judgment
Case
Chambers
Chancery
Cestui que Trust
Cestui que Use
Master in Chancery
Citation

Month
Attachment
Foreign Attachment
Letters Rogatory
Lis Pendens
Oath
Notary Public
Precept
Discovery, Bill of
Cognovit
Cognizance
Color
Subpœna
Recoupment
Ex Parte
Distringas
Garnishment
Entry, Writ of
Quia Timet
Qui Tam Action
Interrogatories
Affidavit
Bill of Particulars
Certiorari
Habeas Corpus
Motion
Inquiry, Writ of
Inquisition
In Personam
In Rem
Interpretation
Interpleader
Injunction
Prohibition
Special Proceeding
Specific Performance
Trustee Process
Warrant
Quo Warranto
Intervention
Invoice
Bill of Peace
Acknowledgment
Civil Damage Acts

Forcible Entry and Detainer	Proof
District Attorney	Handwriting
Hilary Term	Testimony
Oyer and Terminer	Privilege
Venue	Privileged Communication
Judicature Acts	Laches
Jurisdiction	Dictum
Judge	Precedent
Jury	Res Adjudicata
Challenge	Presumption
Judge Advocate	Declaration or Affirmation
Oyer	Alteration
Stay	Access
Stare Decisis	Ambiguity
Damages	Argument
Day	Verdict
Marshalling	Special Verdict
Trial	Scotch Verdict
Mistrial	Judgment
Nonsuit	Award
Incident	Appeal
Judicial Notice	Bill of Costs
Evidence	Taxation of Costs
Exception	Bill of Exceptions
Circumstantial Evidence	Execution
Burden of Proof	Supersedeas
Condonation	Exemption
Admission	Sequestration
Examination	Distress
Cross Examination	Equitable Assets
Witness	Receiver
Expert	Winding Up of Company

C. International Law

The subjects or persons of International Law are independent sovereign States or nations. The community constituting such State is permanently established for a political end, is possessed of a defined territory, and is independent of external control. If one or more of these elements be lack-

ing, the community is not a State in the sense of International Law. Individuals choose their associates, and States likewise determine whether and when they wish to maintain relations with a newcomer. A fundamental proposition of International Law is the equality of States, of which Chief Justice Mar-

shall said: "No principle of general law is more universally acknowledged than the perfect equality of nations. Russia and Geneva have equal rights. It results from this equality that no one can rightfully impose a rule on another." See:

International Law
Treaty
Diplomacy
Diplomatic Agents
Envoy
Embassy
Ambassador
Neutrality
Enemy
Embargo
Blockade
Contraband
Mare Clausum
High Seas
Territorial Waters
Seashore

Tide Waters
Bering Sea Controversy
Extraterritoriality
Prescription
Privateering
Piracy
Award
Convoy
Extradition
Foreign Judgment
Foreign Law
War; War in Europe; War Zone
Truce
Acts of Hostility
Comity of Nations
Mainprize
Navigation, Freedom of
Navigation Laws
Recapture
Retaliation
Rules of the Road
Salvage
Seamen, Laws Relating to

D. History and Miscellany

1. AGRARIAN LAW:

Anglo-Saxon Law
Customary Law
Common Law
Civil Law
Civil Church Law
Twelve Tables
Salic Law
Scotch Law
Spanish Law
Oléron, Laws of
Law Merchant

2. PARLIAMENTARY LAW:

Revised Statutes
Medical Jurisprudence
Maxims

Legal Education

3. The following are a few of the names in the ranks of jurists, lawyers, and publicists of all time:

Austin, John
Betts, S. R.
Binney, Horace
Black, J. S.
Blackstone, William
Bluntschli, J. K.
Bodin, J.
Bracton, Henry de
Brougham, Lord
Campbell, John
Choate, Rufus
Coke, Edward

Cooley, T. M.
Curtis, G. T.
Ellsworth, Oliver
Erskine, Lord
Fearne, Chas.
Feuerbach, P. J. A.
Field, D. D.
Field, S. J.
Filangieri, G.
Fortescue, John
Gans, E.
Glanvill
Grotius, Hugo
Hale, Matthew
Holt, John
Janet, Paul
Jeffreys, Lord
Johnson, Reverdy
Kent, James
Laboulaye, E. L.
Lamar, L. Q. C.
Langdell, C. C.

Lieber, Francis
Livingston, Edward
Lowell, A. L.
Maine, Henry
Mansfield, Earl
Marshall, John
Montesquieu, C.
Moore, J. B.
Pardessus, J. M.
Parsons, Theophilus
Plowden, E.
Pollock, F.
Portalis, J. E. M.
Pufendorf, S.
Savigny, F. K.
Smith, Goldwin
Stephen, J. F.
Story, J.
Taney, R. B.
Tocqueville, A. C.
Wharton, F.
Woolsey, T. D.

Chapter 3. Sociology

Sociology

SOcial science presents a theoretical and a practical aspect, of which the latter, at the present time, is the more important. Speculation on the origins of social life, the evolution of social institutions, and the nature of existing social bonds has been rich in theories, diverse in view, but casting light on all the course of human development. Society has been variously regarded as an aggregate, an organization, or an organism, and accordingly as it has been regarded its rights and duties as against the individual have been outlined. The influence of the collective body and the collective mind on the body and mind of the individual forms one of the most fascinating topics of sociology, fascinating because of the close connection that may be established between individual and social progress. But as yet scarcely sufficient material has been collected to make social theory strictly scientific, and the greater interest, probably, attaches to what has been called the practical aspect of social science, the study, namely, of contemporary social conditions and the problems which they create. Thus it would not be far from the truth to call practical sociology, social pathology, for as a matter of fact the attention of the working sociologist is directed, in greater part, to the study of the ills of the social body, a study of those individuals and classes of individuals whose presence in the midst of society is a burden or a source of danger to society or the cause of misery to themselves. In this respect social science deals with the helpless and the vicious and is largely coincident with humanitarianism. Theoretical sociology is most closely allied to Anthropology and History, going to the latter for its evolutionary data and to the former for origins. Practical sociology depends very largely on statistics.

I. The methods and theories of sociology are treated at length under that heading, supplemented by minor articles on subsidiary topics. This article, therefore, should be made the starting point on reading. See:

Sociology
Man, Science of
Anthropo-geography
Acclimatization
Environment
Standard of Living
Crowd

A discussion of various social institutions which form part of the data

of the sociologist, such as the Family, Marriage, the Tribe, etc., will be found in the chapter on Anthropology and Ethnology.

II. 1. Taking human aggregates as its subject matter, practical sociology draws the greatest uses from statistics. The gathering of statistical data is being initiated wherever governments have as yet failed to assume the office, and where official enumerations prevail their scope is constantly being widened. The study of population is now well advanced. See:

Demography
Census
Population
Vital Statistics
Births, Registration of
Illiteracy
Transportation, Penal
Immigration
Emigration
Migration
Colony
Oriental Immigration
Naturalization
Suicide
Infanticide
Divorce
Marriage
Statistics

Charitable Trusts
Rockefeller Foundation
Rockefeller, J. D.
Rockefeller, J. D., Jr.
Carnegie, A.
Charities
Charities and Correction, National
Conference of
Charity Organization Society
Brinkerhoff, Roeliff
Elberfeld System
Blind, Education of the
Keller, H. A.
Perkins, T. H.
Bridgman, L.
Howe, S. G.
Deaf Mute (*Institutions*)
Gallaudet, E. M.
Insane Asylum
Insanity
Idiocy
Mental Defectives
Mental Pathology
Medical Jurisprudence
Bedlam
Degeneracy
Jukes, The

2. "Dependents, Defectives, Delinquents," adequately describes the subjects dealt with by the social pathologists. In this immensely broad field, private efforts coöperate with State activity, the former through investigations and advocacy largely, the latter through remedial legislation and the use of State resources. For a study of the dependent and defective classes, see:

Dependents, Defectives, Delinquents
Social Debtor Classes
Debt
Pauperism
Poor Laws
Poor Rate
Casual Poor
Mendicancy
Eugenics
Tramp
Vagrant
Unemployment
Workhouse
Almshouse

3. Of dependent classes, children, naturally, absorb a large share of the attention of the sociologist and the charity worker. The mission here is not one of relief only, but of redemption, and successful effort in this field discounts future dangers to society. See:

Dependent Children
Foundling Hospital
Penology
Crèche
Marbeau, J. B.
Infant School
Ragged Schools
Rauhes Haus

George Junior Republic
 Parks and Playgrounds
 Juvenile Court
 Juvenile Offenders
 Lindsey, B. B.
 Children, Societies for
 Cruelty to Children, Prevention of
 Children's Aid Society
 Schools
 Wirt, Wm. A.

4. Sufficient reason exists for speaking of a criminal class to make Criminology an independent branch of investigation with something of the methodology of a science. The delinquent, the criminal, is regarded as at war with society. The causes that have changed the course of nature in him and made him anti-social may be heredity or environment or both. The prevention and punishment of crime and the possible reformation of the criminal form the subject matter of the "science." See:

Criminology
 Lombroso, Cesare
 Bertillon System
 Finger Prints
 Punishment
 Corporal Punishment
 Flogging
 Penology
 Capital Punishment
 Prisons
 Osborne, T. M.
 Convict
 Convict Labor
 Clinton State Prison
 Newgate
 Fleet Prison
 Millbank Prison
 Bicêtre
 Conciergerie

Transportation, Penal
 Botany Bay
 Bagnes
 Recidivists
 Reformatories
 Elmira Reformatory
 Juvenile Offenders
 Brockway, Z. R.
 Ticket of Leave
 Mettray
 Beccaria, C. B.
 Howard, John
 Round, W. M.
 Fliedner, T.
 Fry, Elizabeth
 Prison Association, American
 Prison Buildings
 International Prison Congress

5. The vices of individuals, as well as of classes, affect the welfare of the body politic. (a) The standard of personal purity is rising with the general heightening in moral tone. (b) The evils resulting from the abuse of liquor have led to one of the most notable movements of the nineteenth century. See:

- (a) Family
 - Marriage
 - Divorce
 - Infanticide
 - Syphilis
 - Concubinage
 - Eugenics
 - Celibacy
 - Illegitimacy
 - Bastard
 - Prostitution
 - White Slavery
- (b) Intoxicating Liquors
 - Intoxication
 - Temperance
 - Prohibition

Prohibition Party (Under Temperance)

License

Liquor Traffic

Excise

Local Option

Gothenburg System

Abstinence Societies

Mathew, T.

Dow, N.

Gough, J. B.

Keeley, L.

Chafin, E. W.

Lend-a-Hand Clubs

Loyal Temperance League

Woman's Christian Temperance Union

World's Woman's Christian Temperance Union

Temperance, Sons of

Good Templars, Independent Order of

6. The problem of remedying social evil has drawn the attention of men in all ages, and thinkers have been fond of busying themselves with the construction of ideal forms of society since the days of Plato. More than philosophers' dreams, however, are the great social movements of modern times, whose aim is the reorganization of society on a different basis than that of the present—private property.

(a) For the literary utopias, see:

Plato (The Republic)

Campanella (The City of the Sun)

Defoe, Daniel (An Essay on Projects)

More, Thomas (Utopia)

Harrington, James (Oceana)

Bellamy, Edward (Looking Backward)

Bacon, Francis (New Atlantis)

Fénelon, François (Voyage dans l'Île des Plaisirs)

(b) For Communism, see:

Communism

Communitic Societies

Socialism

Shakers

Owen, Robert

Blanc, J. J. L.

Harmonists

New Harmony

Cabet, Etienne

Icarians

Saint-Simon, C. N.

Fourier, F. M. C.

Anarchism

Wells, H. G.

Brook Farm

Hopedale

Oneida Community

Zoar Community

Koreshan Ecclesia

Amana

Noyes, J. H.

Perfectionists

Taborites

Moravians

Anabaptists

Separatists

Ephrota

(c) For Socialism, see:

Socialism

Collectivism

Fourierism

Nationalism

Communism

Value

Capital

Industrial Revolution

Debs, E. V.

Berger, V. L.

National Workshops

Saint-Simon, C. H.

Fourier, F. M. C.

Rodbertus, J.

Enfantin, B. P.

Bazard, A.

Considérant, V. P.

Babeuf, F. N.

Proudhon, P. J.

Blanc, J. J. L.

Marx, Karl

Lassalle, F.

Engels, F.

Internationale

Weitling, W.

Liebknicht, K.

Liebknicht, W.

Gronlund, L.

Bellamy, E.

Bebel, F. A.

Vollmar, G. H.

Bernstein, E.

Malon, B.

Godin, J. B. A.

James, E. J.

Millerand, A.

Jaurès, J. L.

Briand, A.

Gronlund, Lawrence

Morris, Wm.

Hyndman, H. M.

Fabian Society

Webb, S.

Kelly, E.

Loria, A.

Wagner, A.

Schmoller, G.

Shaw, G. B.

Nieuwenhuis, D.

Sabotage

(d) For Anarchism, see:

Anarchist

Bakunin, M.

Godwin, William

Proudhon, P. J.

Tucker, B. R.

Hess, Moses

Syndicalism

Industrial Workers of the World

Ferrer

Most, Johann

Nihilism

Michel, Louise

(e) For quasi-socialistic movements,
see:

(a) Municipal Ownership

Single Tax

George, Henry

(b) Coöperation

Rochdale Pioneers

Consumers' League

Profit Sharing

Leclaire, E. J.

7. Socialism is heterodox in exalting the State over the individual, yet there is rapidly growing recognition of the right of the State to intervene for the protection of the working classes, and to assume functions tending to further their welfare. See:

Factory Inspection

Labor Legislation

Employers' Liability

Employment Bureau

Social Insurance

Labor Church

Labor Colonies

Labor Congresses

Labor Day

Labor Organizations

Labor Party

Labor Problems

Labor Exchange

Child Labor

Sweating System

Lodging Houses

Housing Problem

Tenement House Problem
 Bath Houses, Municipal
 Postal Savings Banks
 Old Age Pensions
 Vacant Lot Farming

8. A recent development of social work is the settlement house established in the congested district of great cities to act as a centre of physical and moral uplifting. See:

Social Settlements
 People's Palace
 Toynbee, Arnold
 Hull House
 Addams, Jane
 Boys' Clubs
 Fresh-Air Work
 George Junior Republic

See also: Salvation Army; Booth, Charles; Pullman; Krupp Foundries, Social Work at; Y. M. C. A.; Y. W. C. A.

9. For a problem specifically American, see:

Negro in America
 Negro Education
 Hampton Normal and Agricultural Institute
 Tuskegee Normal and Industrial Institute
 Washington, Booker T.

Societies in the narrow sense, associations, that is, of individuals, for the attainment of a common aim, have always existed, illustrating in the miniature the gregarious nature of man. Their purpose may be various, social, political, religious, educational, or protective. See for types of each:

Societies
 Club
 Benefit Societies

Friendly Society
 Building and Loan Associations
 Secret Associations
 Burschenschaft
 Carbonari
 Mafia
 Camorra
 Fenian Society
 Patriotic Societies
 Orders
 Templars, Knights
 Hospitalers
 Brotherhoods, Religious
 Jesuits
 Societies for Ethical Culture
 Fraternities, American College
 Academy
 Institute of France
 Royal Society
 Historical Associations, American
 Masons, Free
 Odd Fellows, Independent Order of
 Pythias, Knights of
 Elks, Benevolent and Protective
 Order of
 Hibernians, Ancient Order of
 Industrial Workers of the World

10. A partial list only of writers and investigators in sociology would include:

Addams, Jane
 Althusius, Johannes
 Ammon, Otto
 Angell, George Thorndike
 Appert, B. N. M.
 Barth, Paul
 Barton, Clara
 Baxter, Robert D.
 Bebel, F. A.
 Birkbeck, George
 Bodin, Jean
 Booth, Charles
 Buckle, Henry T.

- Burdett-Coutts, A. G.
Burdett-Coutts, W. L. A.B.
Buxton, Sir Thomas F.
Considérant, V. P.
Cooper, Peter
Coram, Thomas
Crandall, Prudence
Darling, Grace
Durkheim, E.
Enfantin, B. P.
Fairbanks, Arthur
Faithfull, Emily
Folks, Homer
Fourier, François C. M.
Fry, Elizabeth
Galton, Sir Francis
Giddings, F. H.
Girard, Stephen
Godin, Jean B. A.
Gompers, Samuel
Gumplowicz, Ludwig
Gurney, J. J.
Guy, Thomas
Hanway, Jonas
Henderson, C. R.
Hill, Octavia
Hill, Sir Rowland
Hobhouse, L. T.
Holyoake, G. J.
Howard, John
Kidd, Benjamin
Kyrle, John
Lassalle, Ferdinand
Le Bon, G.
Le Play, P. G. F.
Liebknecht, K.
Liebknecht, W.
Livermore, M. A.
Lloyd, Henry D.
Mathew, Theobald
Montefiore, Sir Moses H.
Montyon, A. J. B.
Moon, William
Mott, Lucretia
Neale, Edward V.
Pinkerton, Allen
Rowton, M. W. L.
Sadler, M. T.
Schäffle, A.
Schulze-Delitzsch, H.
Seligman, E. R. A.
Sharp, Granville
Smith, Gerrit
Stuckenberg, J.
Tarde, G.
Torrens, W. T. McC.
Toynbee, Arnold
Ward, Lester F.
Waugh, Benjamin
Webb, Sidney
Willard, Frances E.
Wines, F. H.
Worms, René

Chapter 4. Political Economy

Political Economy

Political Economy has been briefly defined as the science of wealth, but this definition requires a further explanation of the peculiar sense in which the term wealth is employed. Wealth has been defined as the body of things that have value, but here again value in the economic sense has a narrower meaning than in ordinary use. Value, in economic discussion, usually means power in exchange, that is, the power of a commodity to command other commodities in exchange. Such attempts at brief definition, however, are not satisfactory, since each primary concept of the science is itself the text for long discussion. The best introduction to the subject will be found in the article, **POLITICAL ECONOMY**, which outlines clearly the content or scope, the relation of political economy to other branches of study, and the methods of investigation or arrangement that it employs.

I. The fundamental principles should then be studied by reference to the following articles:

Wealth
Production
Labor
Division of Labor
Industrialism
Wages
Money
Bank, Banking
Standard of Living
Capital
Interest
Usury
Rent

Tax
Single Tax
Métayer
Profit
Monopoly
Speculation
Consumption
Value
Coöperation
Distribution
Exchange
Tariff

The history of economic thought should be studied next. In ancient and mediæval times political economy was not marked off from other branches of learning, and no attempt was made to study it systematically. From the historical paragraphs in the article, **POLITICAL ECONOMY**, it will be seen that to the Greek and Roman philosophers, as well as to the mediæval churchmen, the laws of trade were of interest mainly in their moral bearings. Even in the eighteenth century, when some of its principles were understood, and something like a systematic study was attempted, its scope and importance were not realized. It was regarded as a branch of statecraft. Not private wealth, but the best means of increasing financial power of the state was the main object of investigation. For an account of the various systems of economic thought, and the contributions of individual economists, see the following:

Mercantilism
Physiocrats
Laissez-Faire

Manchester School
 Free Trade
 New Freedom
 Open Door
 International Trade
 Protection
 Balance of Trade
 Navigation Laws
 Tariff
 Quesnay, F.
 Smith, Adam
 Ricardo, D.
 Malthus, T. R.
 Thünen, J. H. von
 Say, J. B.
 Carey, H. C.
 Bastiat, F.
 Mill, J. S.
 Cairnes, J.
 Jevons, W. S.
 Walker, F. A.
 Marshall, Alfred
 Boehm von Bawerk, E.
 Clark, J. B.
 Wagner, Adolf
 Schmoller, G.
 Menger, K.
 Nicholson, J. S.
 Patten, S. N.

Obviously the study of past economic conditions is essential to an understanding of the present. On the general subject of Industrial Evolution consult the following:

Manufactures
 House Industry
 Mir
 Guild
 Hanseatic League
 Merchants Adventurers
 Mercantilism
 Physiocrats
 Industrial Revolution

Factories and the Factory System

Cartwright, E.
 Open Field System
 Agriculture
 Hargreaves, J.
 Arkwright, Sir R.
 Crompton, Samuel
 Watt, James
 Whitney, Eli
 Spinning
 Weaving
 Wool
 Cotton
 Loom
 Textile Manufacturing
 Eight-Hour Day

(See UNITED STATES, GREAT BRITAIN, GERMANY, etc., for economic evolution of those countries.)

II. Reading the above topics in the order given will have supplied the theoretical and historical basis for the study of actual conditions, practical questions, and proposed measures of reform, which are arranged logically in the following lists:

1. TRADE AND TRANSPORTATION:

Commerce
 Barter
 Chamber of Commerce
 Imports and Exports
 Demand and Supply
 Exchange
 Foreign Money
 Ad Valorem
 Coasting Trade
 Competition
 International Trade
 Balance of Trade
 Stock Exchange
 Bond
 Stock

Bucket Shop
Customs Duties
Lloyds
Underwriter
Crisis, Economic
Speculation
Transportation
Railways
Express Company
Baggage
Commerce Court
Treaty
Commercial Treaties
Reciprocity
Tariff
Geography, Economic
Mercantile Agency
Port of Entry
Pooling
Labor and Commerce, Department
of
Municipal Ownership

See also statistics of Commerce and
Railways under the various countries,
as UNITED STATES, GREAT BRITAIN,
CHILE, etc.

2. LABOR AND CAPITAL:

Trade Unions
Labor
Capital
Labor and Capital, Relations of
Socialism
Communism
Anarchism
Political Economy
Division of Labor
Labor Organizations
Knights of Labor
Labor, American Federation of
Industrial Workers of the World
Wages
Minimum Wage
Labor Union, The American

Railway Brotherhoods
Typographical Union of North
America
Letter Carriers, National Associa-
tion of
Metal Trades Association
Miners, Western Federation of
Mine Workers of America
Labor Representation Committee
Labor Party, British
Manufactures
Strikes and Lockouts
Industrial Arbitration and Concilia-
tion
Sabotage
Syndicalism
Eight-Hour Day
Standard of Living
Union Label
Interlocking Directorates
Boycotting
Lockout
Picketing
Labor Problems
Labor Colonies
Labor Congresses
Contract Labor Law
Labor Day
Labor Legislation
Labor, Department of
Labor Church
Industrial Revolution
Sweating System
Employment Bureau
Labor Exchanges
Labor, Bureaus of
Child Labor
Employers' Liability
Workingmen's Compensation
Accidents, Industrial
Factory Inspection
Social Democracy
Shops
Injunction

3. GOVERNMENTAL REGULATION AND
ENCOURAGEMENT OF COMMERCE
AND INDUSTRY:

Protection
Customs Duties
Tariff
Drawback
Warehousing System
Mercantilism
Industrial Commission
Latin Union
Hamilton, Alexander
List, Friedrich
Balance of Trade
Corn Laws
Anti-Corn-Law League
Cobden Club
Reciprocity
Shipping Subsidies
Coasting Trade
Monopoly
Trusts
Trust Fund Doctrine

4. MONEY AND CREDIT:

Money
Precious Metals
Foreign Money
Bullion
Coinage
Numismatics
Index Numbers
Tabular Standard
Bimetallism
Latin Union
Monetary Conferences
Monetary Commission
Gresham, Sir Thomas
Gresham's Law
Greenbacks
Currency
Greenback Party
Specie Payments, Suspension and
Resumption of

Fiat Money
Credit
Credit, Letter of
Crisis, Economic
Interest
Bank, Banking
Land Banks
Clearing-House
Trust Companies
Bill of Exchange
Exchequer Bills
Crédit Foncier
Mortgage Banks
Rural Credit
Reserve Bank, Federal

5. TAXATION AND FINANCE:

Finance
Tax, Taxation
Debt, Public
Independent Treasury
Repudiation
Tariff
Customs Duties
Excise
Internal Revenue System
Budget
Income Tax
Land Tax
Special Assessment
Single Tax

See also sections on *Finance* under
the various countries, as UNITED
STATES, GREAT BRITAIN, BRAZIL, etc.

6. INSURANCE AND SAVINGS INSTITU-
TIONS:

Insurance
Life Insurance
Fraternal Insurance
Fire Insurance
Marine Insurance
Friendly Societies
Workingmen's Insurance

Tontine
 Underwriter
 Annuity
 Savings Banks
 Post Office Savings Bank
 Trust Companies
 Building and Loan Associations

7. AMONG PROMINENT ECONOMISTS,
 in addition to those already named in
 the lists, are the following:

Achenwall, Gottfried
 Adams, H. C.
 Aguado, A. M.
 Anderson, James
 Ashley, W. J.
 Astor, John Jacob
 Atkinson, Edward
 Bagehot, Walter
 Baring
 Baring, A.
 Bastable, C. F.
 Bastiat, F.
 Bates, Joshua
 Baudrillart, H. J. L.
 Baxter, Robert D.
 Beckmann, Johann
 Bemis, Edward W.
 Biddle, Nicholas
 Blanqui, J. A.
 Block, Maurice
 Bodin, Jean
 Boehm von Bawerk, E.
 Boisguilbert, P. le P.
 Brentano, L. J.
 Cairnes, John E.
 Carey, Henry C.
 Carli, G. R.
 Cernuschi, Henri
 Chevalier, M.
 Child, Sir Josiah
 Clark, John B.
 Cobden, Richard
 Cohn, Gustav

Cooke, Jay
 Cossa, Luigi
 Courcelle-Seneuil, J. G.
 Cournot, A. A.
 Decker, Sir Matthew
 Dewey, Davis R.
 Drexel, Anthony J.
 Ely, Richard T.
 Engel, Ernst
 Farr, William
 Farrer, T. H.
 Faucher, J.
 Fawcett, Henry
 Ferraris, C. F.
 Field, Cyrus F.
 Fisher, I.
 Fisk, James
 Fix, Théodore
 Frick, H. C.
 Gage, L. J.
 Galiani, F.
 Garnier, J. C.
 Genovesi, A.
 Giffen, Sir Robert
 Gioja, M.
 Giovanitti, A. M.
 Girard, Stephen
 Glass, Carter
 Gould (family)
 Gournay, J. C. M. V.
 Hadley, A. T.
 Hamilton, Robert
 Harriman, Edward H.
 Haxthausen, A.
 Hermann, F. B. W.
 Hewitt, A. S.
 Hill, James J.
 Hobson, J. A.
 Horner, F.
 Horton, S. D.
 Howe, S. G.
 Hudson, G.
 Hufeland, G.
 Ingram, J. K.

Jenks, J. W.
 Jevons, W. S.
 Kay, Joseph
 King, Wm. L. M.
 Knox, J. J.
 Laing, S.
 Laughlin, J. L.
 Laveleye, Emile
 Law, John
 Le Play, P. G. F.
 Leroy-Beaulieu
 Leslie, T. E. C.
 Levasseur, E.
 Levi, Leone
 List, F.
 Loria, A.
 McCulloch, J. R.
 Mackay, C. W.
 Macleod, H. D.
 Malthus, T. R.
 Marshall, A.
 Mayo-Smith, R.
 Menger, Karl
 Morgan, J. P.
 Mun, Thomas
 Necker, Jacques
 Newmarch, William
 Nicholson, J. S.
 North, Sir Dudley
 Oncken, August
 Overstone, S. J. L.
 Parien, M. L. P. F. E.
 Paterson, Wm.
 Peabody, G.
 Pender, Sir John

Petty, Sir William
 Price, Richard
 Quesnay, F.
 Raiffeisen, F. W.
 Rau, K. H.
 Rogers, J. E. T.
 Roscher, W. G. F.
 Rothschild
 Say, J. B.
 Say, L.
 Schäffle, A. E. F.
 Schmoller, G.
 Schulze-Delitzsch, F. H.
 Seeborn, F.
 Seligman, E. R. A.
 Senior, N. W.
 Soetbeer, A.
 Sumner, W. G.
 Taussig, F. W.
 Tooke, Thomas
 Torrens, Robert
 Tucker, Josiah
 Vanderbilt (family)
 Wagner, Adolf
 Wagner, H.
 Walker, F. A.
 Walker, R. J.
 Walrus, M. E. L.
 Watkin, Sir E. W.
 Wells, D. A.
 Wolowski, L. F. M. R.

8. FOR ECONOMIC AND SOCIAL RE-
 FORM MOVEMENTS, see section 6 of
 the preceding division (Sociology).

Chapter 5. Anthropology

TAKEN in its broadest signification, Anthropology, the science of Man, would include within its scope all the sciences and arts as dealing with particular phases only of the history of human life on earth. Physiology, Psychology, Philosophy, Linguistics and Literature would then be proper fields of study for the anthropologist, as to a large extent they are. But the field of human knowledge is so broad, and the scope of every particular science in fact so extensive, that in the nature of things no single mind can at the present day carry on the work of scientific investigation in more than a limited field of inquiry. Practically, therefore, anthropology, with its allied science of ethnology, has become the study of a man as a zoölogical genus, and secondly, the study of the origins of culture as deduced from ancient remains and the testimony afforded by surviving savage races whose life has as yet undergone no such differentiation as to put it beyond the study of a single mind. Among them are sought the germs of present institutions and beliefs, which are followed up until they become the things of which history takes cognizance. Primitive life, then, is largely the subject of anthropology which deals also with survivals of primitive modes of life and methods of thought in our own times. Thus the topic of Folklore and Customs falls fairly within its field. See:

Man, Science of
Anthropology
Ethnography

1. The study of human anatomy and physiology is of primary importance in the science of man. On the basis of morphological and physiological peculiarities, various classifications of mankind have been made, and our knowledge of prehistoric man is largely a matter of skulls and thigh bones. The measurement of the human body has become a science in itself. See:

Somatology
Cranimetry
Skin
Mongolian Spots
Anthropometry
Melanism and Albinism
Hair
Giants

Dwarf
Skull

2. Remains of prehistoric man have been found in both hemispheres, but most plentifully in Europe. Ingenious comparative studies allow us to arrive at a fair conception of the physical characteristics of the earliest inhabitants of the world. See:

Barrow
Mound-Builders
Megalithic Monuments
Dolmen
Avebury
Stonehenge
Spy
Chelléan
Cro-Magnon
Furfooz Race
Hallstatt Epoch
Madeleine, La

Mousterian Epoch
 Neanderthal Man
 Lansing Man
 Kitchen-Midden

3. For the great divisions of mankind determined on the basis of physical characteristics and geographical distribution, see:

Caucasian Race
 Europe, Peoples of
 Mediterranean Race
 Mongolian Race
 Negro
 Indian Peoples
 Malayan Peoples
 Melanesians
 Indians, American
 Mixed Races

4. On the question of the origin of mankind there has been much disputation among anthropologists with little positive results. See:

Evolution
 Pithecanthropus

5. Man has nowhere been found in complete isolation. From the first he appears as the social being with his life conditioned by the co-existence of others of his kind. Co-existence meant likeness of thought and experience and the necessity of intercommunication. Our interest, therefore, turns to language. See:

Language
 Philology
 Gesture Language
 Sign Language
 Writing
 Hieroglyphics
 Cuneiform Inscriptions
 Wampum

6. In common with the animals

man is early engaged in a struggle for the material needs of existence, with greater needs to satisfy, however, than the animals, and consequently with growing resources.

(a) The desire for food is the primal motive in life. See:

Cannibalism
 Geophagy
 Cookery
 Pottery

(b) According to the nature of the physical conditions amidst which he dwelt, man found shelter for himself. See:

Tent
 Wigwam
 Cave-Dwellers
 Cliff-Dweller
 Mesa
 Earth Lodge
 Lake Dwellings
 Archæology, American
 Casa Grande
 Oaxaca, Ruins of
 Palenque
 Nomad
 Gypsies

(c) Dress, it is well established, came from no need of protecting the body, but had its origin in ornament. See:

Dress
 Tattooing
 Headdress
 Hairdressing

7. Man entered upon a rapid course of development when, in his search for sustenance and shelter, he began the use of tools. See:

(a) For Implements:
 Flint Implements

Celt
Stone Age
Bronze, Age of
Archæology, American
Paleolithic Period

(b) For Weapons:

Arrow
Blowgun
Tomahawk
Boomerang
Scalping

For the beginnings of the agricultural stage, see:

Agriculture
Plow
Domestic Animals

8. The religion of primitive man is essentially the belief in a universally animated world, a world of spirits, to combat and placate whom is the business of his life. See:

Animism
Totemism
Superstition
Religion, Comparative
Magic
Necromancy
Oracle
Nature-Worship
Fire-Worship
Phallicism
Fetishism
Shamanism
Amulet
Manitou
Demonology
Demonic
Satanism
Voodoo
Ghosts
Fast
Sacrifice

9. Birth and death are naturally portentous phenomena to the primitive mind, and are marked, death especially, by various ceremonies. In case of death the rites connect themselves with the belief in existence beyond the grave. See:

Couvade
Circumcision
Teknonymy
Infanticide
Mortuary Customs
Burial
Cist-burial
Suttee
Coffin

10. The origin of the family relation is a subject of much controversy; and the older view that, preceding the present organization of the family under the authority of the father and conditioned by the element of property, mankind passed through a stage in which the family centered around the mother, in whom authority was vested, and from whom descent was traced has been abandoned. See:

Marriage
Matriarchate
Partriarchate
Polygamy
Polyandry
Levirate Marriage
Clan
Tribe
Totemism
Caste
Exogamy
Miscegenation
Slavery

11. Primitive morality is often regarded as utilitarian and narrow in the scope of its application; but a

great deal of data has accumulated to negate this interpretation. In primitive life the social group is independent politically and, hence, frequently hostile with its neighbors, but this is not essentially different from civilized governments. Internally each of these primitive groups is governed by a legal code. Primitive law is summed up in custom. See:

Law
Custom
Taboo

12. Energy not directed towards the direct satisfaction of material wants finds expression among savages in games and sports. *Æsthetics*, modern research goes to show, had its origin in play. See:

Art, Primitive
Æsthetics
Swastika
Festivals
Dancing
Corroboree
Sun Dance
Snake Dance
Music
Areois
Potlatch

13. The survival of primitive thought in custom, legend, superstition, and common practices shows how continuous is the line of development from the mental life of primitive man to our own. For the entire subject of folk lore, see:

Folklore
Nursery Lore
Nursery Rhymes
Superstition
Magic

Witchcraft
Incantation
Vampire
Werwolf
Griffin
Dragon
Unicorn
Mermaid
Fairy
Morgan, the Fay
Avalon
Goblins
Oberon
Puck
Robin Goodfellow
Baring-Gould, S.

14. The data of anthropology have been collected from many sources, and the outline of the principles of the science may be filled in with concrete detail, by referring to the many descriptive articles on the primitive peoples. Of the most interesting primitive groups for the anthropologists, a partial list would be the following:

(a) For America, see *INDIANS*, *AMERICAN*, an elaborate study which may be carried into great detail by following out the cross references to every tribe of North, Central, and South America. See also *ESKIMO*.

(b) For Asia:

Philippine Islands
Aino
Andamanese (under Andamans)
Sundanese (under Sunda Islands)
Dyak
Gonds
Gurkhas
Khonds

Karens
 Mois
 Miao-Tse
 Shans
 Thai
 Todas
 Veddas
 Baluchis (under Baluchistan)
 Bhil
 Bedouin
 Kurds
 Buriats
 Giliaks
 Kalmucks
 Golds
 Kirghiz
 Koriaks
 Ossetes
 Tchuktchi
 Tchuvashes
 Tatars
 Ugrians
 Uzbeks
 Vedahs
 Yakuts
 Yukagirs
 Malayan Peoples
 Polynesians
 Melanesians
 Micronesians
 Negritos

(c) For Africa:

Akka
 Bantu
 Bejas
 Berber
 Kabyles
 Bushmen
 Hottentots
 Kafirs
 Dinka
 Fellah
 Masai

Hausa (under Hausa States)
 Niam Niam
 Somali
 YOLOF
 Yoruba
 Zulus (under Zululand)

(d) For Australasia:

Australians (under Australia)
 Maoris
 Tasmanians (under Tasmania)

(e) For Europe:

Europe, Peoples of
 Basque Race
 Gypsies
 Lapps (under Lapland)

15. A partial list of well-known anthropologists would include the following names:

Andre, R.
 Bandelier, A. F. A.
 Bastian, A.
 Beauchamp, W. M.
 Berendt, K. H.
 Boas, F.
 Brinton, D. G.
 Broca, P.
 Catlin, G.
 Cushing, F. H.
 Faidherbe, L. L. C.
 Flower, W. H.
 Fritsch, G. T.
 Furness, W. H.
 Gatschet, A. S.
 Haddon, A. C.
 Hale, H.
 Hartmann, R.
 Hodge, F. W.
 Holmes, W. H.
 Kanitz, F. P.
 Kroeber, A. L.
 Laufer, B.

Lubbock, J.
McCurdy, J. F.
McGee, W. J.
McLennan, J. F.
Mallery, G.
Mantegazza, P.
Mason, O. T.
Mooney, J.
Morgan, Jacques de
Morgan, L. H.
Mortillet, L. L.
Pilling, J. C.
Powell, J. W.
Prichard, J. C.

Putnam, F. W.
Quartrefages, J. L. A.
Ranke, J.
Ratzel, F.
Reinach, S.
Ripley, W. Z.
Rivers, W. H. R.
Schoolcraft, H. R.
Sergi, G.
Smith, Buckingham
Squier, E. G.
Topinard, P.
Tylor, E. B.
Ujfalvy, C. E.

Chapter 6. Religion

OF THE numerous classifications of religion, none of which is free from many serious objections, we may adopt as the most practical that which divides creeds into monotheistic and non-monotheistic; and though here, too, we are confronted by the difficulty that certain faiths are neither one nor the other, completely, we may apply the former term to the three great religions of Judaism, Christianity, and Mohammedanism, and classify under the second heading all beliefs whatsoever, from primitive animism through the various national mythologies to the great moral and philosophic systems of the East. The starting point should be the comprehensive article on **RELIGION, COMPARATIVE**. The subject may be then pursued through such general articles as **BELIEF, WORSHIP, RITE, PRAYER, SACRIFICE, PRIEST**, etc. Additional titles, in great number, will naturally suggest themselves to the reader. The field, indeed, is extensive and touches intimately on the domains of Anthropology, Psychology, Philosophy, and History. This will be found especially true in the religions of the East, where philosophy and mythology or religion are practically one.

A. Polytheistic Religions

1. The beginnings of religion, as studied in the beliefs of primitive races, will be found treated in the chapter on Anthropology, where appear such titles as

Man, Science of
Nature-Worship
Fetishism, etc.

The subject is carried on in the special articles dealing with individual tribes and nations, of which a list appears in the same chapter.

2. The religions and mythologies of the Babylonia, Assyria, Egypt, Greece, and Rome are discussed in the chapter on History, in the various sections devoted to those countries. The intimate connection of the religions and the political life in the ancient world has made this division seem desirable.

3. The mythology of the Scandinavian and Teutonic races differs from

that of Greece in its pervading atmosphere of gloom and the foreboding of fate. The northern divinities lack the joyous grace and humanity of the **Olympian** pantheon, and the powers of darkness, cold, and death play a far more conspicuous part. See:

Mythology
Polytheism
Scandinavian and Teutonic Mythology
Edda
Aesir
Asgard
Bifröst
Yggdrasil
Mimir
Norns
Odin
Tyr
Thor
Bragi

Balder
Loki
Freyja and Frigga
Ragnarök
Fenrir
Walhalla
Hel
Niflheim

4. We leave pure polytheism in passing to the great religions of India. It, there, evolves with time into complex systems of mythology modified by pantheism and agnosticism.

(a) BRAHMANISM.

Brahmanism may go back to the second millennium before the Christian era, and comprises the mass of beliefs and institutions originated or elaborated from a primitive nature-worship, by the Brahmans, who constitute the dominant class among the Hindus. It is essentially a legislative system, with a vast and minutely outlined ceremonial. In its later development, it is characterized by pantheism, the doctrine of Karma, and metempsychosis. See:

Brahmanism
Aryan
Veda
Brahmana
Upanishad
Manu
Brahma
Varuna
Agni
Indra
Ushas
Maruts
Pitris
Sankhya
Nyaya
Vedānta

Mahabharata
Rāmāyana
Vishnu
Śiva
Krishna
Purāṇa
Tantra
Vaishnavas
Śaivas
Śāktas
Pārvatī
Kali
Lakshmi
Hanumān
Ganesa
Śraddha
Caste
Henotheism
Karma
Metempsychosis
Theosophy
Sikhs

(b) BUDDHISM.

Buddhism antedates Christianity in its origin, and its adherents are second in number only to those of the Christian faith. Taking its rise in Hindustan, it has spread over China, Indo-China, Japan, Tibet, and the plains of Northern and Central Asia. In that continent, its mission as a bearer of civilization and morality has been not unlike the rôle played by Christianity in Europe and America. See:

Buddhism
Pitaka
Asoka
Metempsychosis
Karma
Nirvana
Śravaka
Shin-Shu
Bonze

For a Variant of Buddhism, see

Lamaism

And, for an Allied Creed, see

Jainism

See also Brahmanism, above.

5. ZOROASTRIANISM.

In the great religion of Iran, we may find the earliest traces of primitive Aryan belief. Zoroastrianism is important for the influence it exercised on Judaism and Christianity, to which it contributed the great dualistic principle of the conflict between good and evil. See:

Zoroastrianism

Zoroaster

Avesta

Gâthâs

Pahlavi Language and Literature

Magi

Parsis

Ghebers

Ormazd

Ahriman

Mithras

Asmodeus

Saoshyant

6. The prevailing religion in China and Japan is Buddhism. The native religious systems of China are in reality moral philosophies. In Japan, however, we find a peculiarly national religion, influenced to some extent by Chinese and Buddhistic elements. See:

(a) Confucius

Mencius

Chu-Hi

(b) Taoism

Lao-tse

(c) Shintō

Kōbō Daishi

Fox-deity

Bushido

B. Monotheistic Religions

I. JUDAISM.

The history of the Jewish people, who claimed to be the nation specially favored of the One God, and the sole depository of His revelation, will be largely found in the historical chapter of this book; but here a few further indications may be given of some of their peculiar institutions. Their worship, in its earlier form, is described under TABERNACLE, then under TEMPLE, and in a special section of the article SACRIFICE, and a still later development is treated under SYNA-GOGUE.

Special observances at particular seasons are treated under:

.Passover

Purim

Atonement, Day of

Pentecost

Dedication Feast

Weeks, Feast of

Tabernacles, Feast of

Sabbath

Jubilee, Year of

On their sacred writings, besides the articles on each book of the Old Testament, see:

Talmud

Targum

Midrash

Gemara

Mishna

The functionaries of their religion and justice come under:

Priest
 High Priest
 Levite
 Scribe
 Rabbi
 Sanhedrin

Other characteristic customs and usages:

Circumcision
 Tithes
 Unction
 Proselyte
 Urim and Thummim
 Phylactery

The sects and parties which developed in course of time among the race are detailed under JEWISH SECTS, and specially in the following articles:

Pharisees
 Sadducees
 Essenes
 Chasidim
 Frank, Jacob

II. CHRISTIANITY.

1. FOUNDATIONS. The history of Christianity is so diversified, and so intimately bound up with the development of European civilization, that a large amount of space is necessarily accorded to it. The most convenient division will begin with the foundations, including under that head the articles centring around its Founder and the history and worthies of the first few centuries of the Christian era, before Europe was submerged in the chaos which resulted from the barbarian invasions. See:

Christianity
 Creeds and Confessions
 Fundamentals of Christian Doctrine
 Development of Doctrine

God
 Jesus Christ
 Incarnation
 Hypostatic Union
 Atonement
 Intercession, Doctrine of
 Resurrection
 Miracles
 Holy Ghost
 Filioque
 Trinity, Doctrine of the
 Nicene Creed
 Prayer
 Providence
 Predestination
 Foreknowledge and Foreordination
 Sin
 Original Sin

Besides the article under the title ESCHATOLOGY, several others which follow deal with the problems which have so exercised the mind of man as to his ultimate destination after the short period of life in this world. See:

Immortality
 Judgment, Final
 Millennium
 Second Advent of Christ
 Apocalyptic Literature
 Antichrist
 Annihilationism
 Heaven
 Beatific Vision
 Hell
 Probation after Death
 Purgatory
 Limbus

The following articles deal with the organizations by whose means the religion of Christ was spread throughout the world, and with early records of its faith and practice:

Church

Council
 Synod
 Missions, Christian
 Apostle
 Doctors of the Church
 Fathers of the Church
 Persecutions of the Christians
 Lapsed
 Catechumens
 Disciplina Arcani
 Agapæ
 Teaching of the Twelve Apostles
 Apostolic Constitutions
 Apostolic Fathers
 Jerusalem, Councils of
 Nicæa, Councils of
 Constantinople, Councils of
 Ephesus, Councils of
 Council of Chalcedon (under Chalcedon)
 For the great figures of the period of foundation and dissemination, see:
 Mary
 Joseph
 John the Baptist
 Peter
 Paul
 John
 James
 Philip
 Bartholomew
 Thomas
 Andrew
 Jude
 Barnabas
 Matthias
 Mark
 Luke
 Mary Magdalene
 Timothy
 Titus
 Stephen
 Justin Martyr
 Ignatius

Irenæus
 Polycarp
 Agnes
 Agatha
 Alban
 Apollos
 Athanasius
 Arius
 Augustine
 Barbara
 Basil
 Boniface
 Cassianus, Johannes
 Cecilia
 Chrysostom
 Cyprianus
 Cyril of Alexandria
 Cyril of Jerusalem
 Denis
 Dionysius
 Ephraem
 Epiphanius
 Eusebius
 Felicitas
 Fortunatus, Venantius
 Gregory of Nazianzus
 Gregory of Nyssa
 Gregory Thaumaturgus
 Gregory of Tours
 Hilary
 Hippolytus
 Hosius
 Isidore of Seville
 Jerome
 Lawrence
 Martin of Tours
 Patrick
 Prudentius, Aurelius Clemens
 Theodore of Mopsuestia

2. EARLY SECTS AND HERESIES.

No sooner had the Christian Church been fully organized and entered upon its mission of converting, than the infinite diversity of human minds im-

pelled different men to emphasize disproportionately some one aspect of the faith which all at first held in common. This was especially the case during the first three centuries, while Christianity had its chief stronghold in the East, the speculative and dialectical minds of whose people were naturally inclined to minute questions of abstract theology. The heresies which took their rise in the West were of a more practical kind, dealing, like Montanism, with the severity of discipline, or, like Pelagianism, with the freedom of the human will. Those who wish to trace the abstruse questions which threatened to divide the Church even before it had emerged from the shadow of persecution, may consult especially the following articles:

Adiaphorists
 Adoptian Controversy
 Arius
 Aëtius
 Agnoetæ
 Alogians
 Apollinaris
 Celsus
 Cerdonians
 Cerinthus
 Docetæ
 Donatists
 Dositheans
 Ebionites
 Elkesaites
 Eutyches
 Gnosticism
 Hesychasts
 Iconoclasm
 Macedonians
 Manichæism
 Monarchians
 Monophysites
 Monothelitism

Montanus
 Nestorians
 Nicolaitans
 Novatian
 Origen
 Patripassianism
 Paulicians
 Pelagianism
 Sabellius
 Semi-pelagianism
 Valentinians
 Vigilus

3. TRADITIONAL CHRISTIANITY. The latter history of Christianity may be most conveniently divided into two main heads—according as the various Christian bodies have adhered, to a greater or less extent, to the older usages or beliefs, or have broken away from them, and evolved new ones of their own. Of these two divisions, the former is inevitably much the larger, covering a much greater extent of time and a wider range of subjects. The naturally unchanging East has been less affected by the currents of thought, and the many practical problems, which have introduced many changes or developments in the western world. The articles PAPACY, which traces the history of the central see of Christendom, down to the Council of Trent; ROMAN CATHOLIC CHURCH, which includes the subsequent history of the churches in communion with it; and GALRICAN CHURCH, give a large part of the general institutional development; and the biographies of nearly all the Popes, contain valuable indications of the policy which has at different periods guided the larger part of Christendom. The article, CHURCH HISTORY, contains an account of the principal

writers who have narrated this development; and the following articles contain detailed information on all the more important points.

(a) For Church Organization, see:

Patriarch
Metropolitan
Archbishop
Bishop
Titular Bishops
Suffragan
Apostolic Succession
Orders, Holy
Cardinal
Conclave
Legate
Priest
Rector
Vicar
Vicar-General
Archdeacon
Cathedral
Dean
Chapter
Rural Dean
Deacon
Subdeacon
Acolytes
Reader
Exorcist
Ostiarius
Tonsure
Council
Encyclical Letters
Bull
In Cœna Domini
Unigenitus
Brief, Papal
Church Discipline
Excommunication
Dispensation
Indulgence
Inquisition

Congregation
Propaganda
Index
Commandments of the Church
Celibacy

(b) Christianity had scarcely been organized before a definite form of worship was adopted, and this became more and more fixed and uniform in its details as time went on. A great many matters of interest are contained in the history of these liturgical forms, which will be found fully given under numerous titles. See:

Worship
Liturgy
Mozarabic Liturgy
Mass
Requiem
Introit
Kyrie Eleison
Gloria in Excelsis
Collect
Epistle
Gradual
Sequence
Gospel
Offertory
Secret
Missal
Pontifical
Ritual
Processional
Canonical Hours
Breviary
Lesson
Te Deum
Magnificat
Nunc Dimittis
Miserere
De Profundis
Ave Maria
Angelus Domini

Hymnology
 Dies Iræ
 Pange Lingua
 Tantum Ergo
 Veni Creator Spiritus
 Litany
 Benediction
 Rosary of the Blessed Virgin Mary
 Tenebræ

(c) Under **COSTUME, ECCLESIASTICAL**, a full account will be found of the historical development of ecclesiastical vestments and their use at the present day in various parts of Christendom. A number of other articles also give details as to specific vestments and articles used in divine worship. See:

Tiara
 Pallium
 Mitre
 Crosier
 Stole
 Maniple
 Surplice
 Flabellum
 Altar
 Tabernacle
 Incense
 Censer
 Cross
 Chalice
 Corporal
 Agnus Dei

(d) The Christian religion, at least in its ancient and traditional form, is essentially a sacramental one. In other words, it provides for the two-fold nature of man—body and soul—by using outward and visible signs to convey inward and spiritual grace. A large number of important subjects, accordingly, fall under the heading **Sacrament**. See:

Sacrament
 Baptism
 Clinic Baptism
 Heretic Baptism
 Sponsors
 Confirmation
 Lord's Supper
 Transubstantiation
 Viaticum
 Penance
 Confession
 Absolution
 Orders, Holy
 Marriage
 Extreme Unction
 Sacramentals
 Holy Water
 Scapular
 Jubilee
 Pilgrim
 Stations
 Image-Worship
 Foot-Washing

(e) Very early in the history of the Christian Church, special observances began to be connected with certain days—weekly, and annual commemorations of events in the life of its Founder, and anniversaries of the chief worthies who adorned its history. These are treated under:

Sunday
 Friday
 Festivals
 Fast
 Christmas
 Epiphany
 Candlemas
 Annunciation
 Ash-Wednesday
 Lent
 Holy Week
 Maundy Thursday

Good Friday
 Easter
 Ascension Day
 Pentecost
 Trinity Sunday
 Corpus Christi
 Assumption of the Virgin Mary
 All-Soul's Day
 Ember-Days
 Angel
 Michael
 Gabriel
 Saint
 Martyr
 Canonization
 Beatification
 Advocatus Diaboli
 Acta Sanctorum

(f) It is scarcely necessary to enumerate the separate books of the Bible, on which every organization of Christians professes to base its creed. Under each of their titles, the history and purport of every book may be studied, as well as the most approved conclusions of the most recent scientific criticism. Questions relating to the Bible as a whole are discussed at great length in the main article **BIBLE**; and reference may be made to the following subsidiary titles:

Inspiration
 Revelation
 Canon
 Biblical Criticism
 Bible Archæology
 Textual Criticism
 Tübingen School
 Concordance
 Apocrypha
 Deuterocanonical Books
 Bible Society
 Bible, Curious Editions of

4. **THE MONASTIC LIFE.** As the civilized world, under the later Roman empire, grew more and more corrupt, the feeling gained ground that the surest way to escape from the wrath to come was to flee into the desert, and by prayer and mortification to avert the divine displeasure. The monastic life, therefore, considered as the most perfect carrying out of the counsels of Christ, took firm root in the Church. General details of its spirit and organization will be found under:

Monasticism
 Asceticism
 Vow
 Monastery
 Laura
 Hermit
 Recluse
 Pillar Saint
 Abbey
 Abbot
 Canon
 Brothers, Lay
 Brotherhoods, Religious
 Tertiary
 Monastic Art

The earlier monastic ideal was that of absolute separation from the world, considered as an inherently wicked place; and all the older orders, though frequently of the greatest service to society and civilization by their preservation of learning, and by their diligent labors in agriculture and the like, approach more or less the type known as cloistered orders. Of these the principal ones follow in chronological sequence, with their founders, where these have separate articles:

Antony

Paul
 Basilian Monks
 Augustinians
 Benedictines
 Benedict
 Cluniacs
 Camaldolites
 Carthusians
 Bruno
 Chartreuse, La Grande
 Charterhouse
 Cistercians
 Bernard
 Premonstratensians
 Gilbertines
 Beguines
 Carmelites
 Servites
 Celestines
 Brigittines
 Bridget
 Ursulines
 Angela Merici
 Trappists
 Rancé, Armand de

As modern society gradually became organized on more stable foundations, and men whose temperaments and habits were peaceful could be safe under its protection, another type came forward, whose fundamental idea was not retirement from the world, but an effort to sanctify it, by mingling more or less with it. Under the head of what may be called missionary communities, the following are to be noted:

Sisterhoods
 Trinitarians
 Franciscans
 Francis of Assisi
 Clares, Poor
 Clare
 Dominicans

Dominic
 Minimites
 Francis of Paola
 Barnabites
 Theatines
 Capuchins
 Jesuits
 Ignatius of Loyola
 Oratory, Congregation of the
 Philip Neri
 Oblates
 Borromeo, Carlo
 Piarists
 Visitation, Sisters of the
 Francis de Sales
 Chantal, Jeanne Françoise
 Lazarists
 Vincent de Paul
 Sulpicians
 Olier, Jean Jacques
 Brothers and Sisters of Charity
 Brothers of the Christian Schools
 La Salle, Jean Baptiste de
 Passionists
 Paul of the Cross
 Redemptorists
 Liguori, Alfonse Maria di
 Sacred Heart, Ladies of the
 Mercy, Fathers of
 Paulists

5. MEDIEVAL PERIOD. The religious aspect of the Middle Ages will be found represented in nearly every article in the foregoing section; but certain others may be added which give an account of significant developments taking place within this period. Thus we have the formal organization of a whole logical system of dogmatic theology and philosophy (see SCHOLASTICISM), and of a parallel system of ethics or moral theology (see CASUISTRY). The story of the CRUSADES is of great importance, supplemented

under JERUSALEM by the history of the kingdom and patriarchate there established. The crucial controversies between Church and State which persisted throughout the Middle Ages are treated under INVESTITURE and REGALIA as well as under PAPACY. (See also in the chapter on history the section dealing with the Mediæval Ages.) Under SCHISM, WESTERN, we may follow the division within the Church caused by the pretensions of rival popes. The efforts made to secure unity of faith and discipline appear under:

- Lateran Councils
- Basel, Council of
- Ferrara-Florence, Council of
- Pisa, Council of
- Lyons, Councils of
- Inquisition
- Torquemada

The story of those who in this period broke away from that unity is told under:

- Cathari
- Fratricellians
- Albigenses
- Waldenses
- Brothers and Sisters of the Free Spirit
- Apostolic Brethren
- Lollard
- Abélard
- Berengarius of Tours
- Gottschalk
- Wiclif

Other topics of special mediæval interest are:

- Joan, Pope
- Feast of Fools
- Biblia Pauperum
- Pseudo-Isidorian Decretals

- Fulda, Monastery of
- Saint Gall
- Monte Cassino

The great names in the theology, philosophy, and mysticism of the Mediæval Ages include:

- Adalbert
- Ailly, Pierre d'
- Albert, Count of Bollstädt
- Alexander of Hales
- Anselm
- Aquinas, Thomas
- Becket, Thomas à
- Bede
- Bonaventura
- Catharine of Siena (under Catharine)
- Clémanges, Nicolas de
- Columba
- Damiani, Pietro
- Duns Scotus
- Dunstan
- Eadmer
- Erigena, Johannes Scotus
- Joachim of Floris
- Kempis, Thomas à
- Lanfranc
- Lully, Raymond
- Malachy
- Occam, William of
- Peter Lombard
- Peter the Hermit
- Rabanus Maurus
- Savonarola, Girolamo
- Tauler, Johann
- Teresa, St.
- Wadding, Luke
- William of Saint-Amour
- William of Wykeham

6. THE REFORMATION PERIOD. A special section may well be devoted to the period of unrest and disruption commonly known as the Reformation.

All over Europe there was a movement, more or less general and permanent according to local circumstances, towards throwing off the authority of the Pope, simplifying faith and worship, and returning to what were assumed to be primitive beliefs and usages. See:

Reformation
Counter-Reformation
Utraquists
Communion in Both Kinds
Brethren, Bohemian
Augsburg Confession
Interim
Concord, Book of
Corpus Doctrinæ
Magdeburg Centuries
Epistolæ Obscurorum Virorum
Antinomianism
Bartholomew's, Massacre of Saint
Dort, Synod of
Reformed Churches
Trent, Council of

For the Men of this Period, see:

Albert (of Magdeburg)
Baronius, Cæsar
Bellarmine
Beza, Théodore
Bucer, Martin
Bugenhagen, Johann
Cajetan, Thomas
Campion, Edmund
Calvin, John
Canisius, Petrus
Cano, Melchior
Carlstadt
Colet, John
Eck, Johann Maier von
Erasmus, Desiderius
Erastus, Thomas
Faber, Jacques
Fisher, John
Hamilton, Patrick

Hooper, John
Hutten, Ulrich von
Luther, Martin
Melancthon, Philip
More, Thomas
Œcolampadius, Johannes
Philip the Magnanimous
Reuchlin, Johann
Sarpi, Paolo
Tetzel, Johann
Vermigli, Pietro Martire
Wishart, George
Zwingli, Ulrich

7. Before proceeding to a review of the Reformed Churches of modern times, the history of Eastern Christianity, separate from that of the Roman Catholic Church since 1054, may be studied under the following titles:

Greek Church
Filioque
Quinisext
Photius
Lucaris
Nikon
Raskolniki
Dukhobortsy
Molokani
Skoptsy
Stundists

8. MODERN REFORMED CHURCHES.

(a) **ANGLICAN.** The article under the title, **ANGLICAN COMMUNION**, explains the extent and relations of the various churches in communion with the Church of England, which represent characteristically the more conservative elements in the religion of the English-speaking races. Though as organizations they owe their origin to the great upheaval of the sixteenth century, their doctrine and usages are

largely in harmony with those which prevailed before the Reformation, and will be found treated in many instances under titles which include the ancient and modern Roman Catholic belief or practice. The following articles, however, may be consulted for specifically Anglican points:

England, Church of
Ireland, Church of
Episcopal Church
Articles, The Thirty-nine
Prayer-Book
Homily
Lambeth Conference
Church Congress
Supremacy, Royal
Ecclesiastical Commissioners
Vestry
Warden, Church
Parish
Parish Clerk
Lay Reader
Advertisements of Elizabeth
Martin Marprelate Controversy
Savoy Conference
Nonjurors
Nonconformists
Dissenters
Act of Uniformity
Oxford Movement
Gorham Controversy
Ecclesiastical Titles Assumption
Act
Ritualism
Queen Anne's Bounty
Christian Knowledge, Society
for Promoting
Church Temperance Society
Brotherhood of Saint Andrew
Daughters of the King
Bampton Lectures
Hulsean Lectures

Among the prominent names in the history of the Church of England in Great Britain appear:

Cranmer, Thomas
Ridley, Nicholas
Latimer, Hugh
Hooker, Richard
Laud, William
Andrewes, Lancelot
Hall, Joseph
Ken, Thomas
Leighton, Robert
Taylor, Jeremy
Sanderson, R.
Whitgift, J.
Tillotson, John
Wake, William
Atterbury, Francis
Warburton, William
Simeon, Charles
Romaine, W.
Pusey, Edward Bouverie
Keble, John
Rose, Hugh James
Forbes, Alexander P.
Liddon, Henry Parry
Maurice, Frederick Denison
Arnold, Thomas
Robertson, Frederick W.
Milman, Henry Hart
Jowett, Benjamin
Stanley, Arthur Penrhyn
Wilberforce, Samuel
Trench, Richard Chenevix
Vaughan, Charles J.
Wordsworth, Charles
Wordsworth, Christopher
Benson, Edward White
Lightfoot, Joseph Barber
Westcott, Brooke Foss
Thorold, Anthony Wilson
Stubbs, William
Bright, William

Tait, Archibald Campbell
Temple, Frederick

Of the Church in America the leading representatives have been :

Seabury, Samuel
White, William
Hobart, John Henry
Provoost, Samuel
Hopkins, John Henry
Muhlenberg, William Augustus
Tyng, Stephen H.
Whittingham, William Rollinson
Williams, John
Whipple, Henry B.
Potter, Horatio
Potter, Alonzo
Potter, Henry Codman
Brooks, Phillips
Newton, Richard Heber
Dix, Morgan

(b) PRESBYTERIAN :

Presbyterianism
Elder
Moderator
Synod
Westminster Assembly
Perth, Five Articles of
Cameronians
Covenants, The
Infralapsarian
Alexander, Archibald
Alexander, J. A.
Babcock, M. D.
Baird, C. W.
Briggs, C. A.
Burrell, D. J.
Calamy, Edmund
Cameron, J.
Chalmers, Thomas
Cuyler, T. L.
Geddes, J.
Green, W. H.

Hall, John
Hodge, C.
Knox, John
Melville, Andrew
Parkhurst, C. H.
Patton, F. L.
Paxton, J. R.
Prentiss, G. L.
Prime, S. I.
Robinson, C. S.
Shields, C. W.
Talmage, T. DeWitt
Tennent, Gilbert
Watson, John
Witherspoon, J.

(c) METHODIST :

Methodism
Itinerancy
Experience Meeting
Camp-Meeting
Epworth League
Wesley, John
Wesley, Charles
Whitefield, George
Coke, Thomas
Huntingdon, Selima Hastings
Asbury, Francis
Clarke, Adam
Emory, John
Fowler, C. H.
Haven, E. O.
Haven, Gilbert
Hurlbut, J. L.
Hurst, John F.
Moore, D. H.
Moore, Henry
Newman, J. P.
Ouseley, G.
Punshon, W. M.
Sankey, Ira D.
Strong, James
Taylor, W.
Tefft, B. F.

Townley, James
 Townsend, L. T.
 Vincent, J. H.
 Walden, J. M.
 Warren, H. W.
 Watson, R.
 Wise, Daniel

(d) CONGREGATIONALIST:

Congregationalism
 Puritans
 Separatists
 Browne, Robert
 Robinson, John
 Cotton, John
 Mather, Richard
 Hooker, Thomas
 Edwards, Jonathan
 Hopkins, Samuel
 Bellamy, Joseph
 Dwight, Timothy
 Abbott, Lyman
 Bartlett, S. C.
 Beecher, Henry Ward
 Beecher, Lyman
 Bissel, E. C.
 Bushnell, H.
 Dexter, H. M.
 Finney, C. G.
 Gladden, W.
 Park, E. A.
 Parker, Joseph
 Phelps, Austin
 Storrs, R. S.
 Taylor, N. W.

(e) BAPTIST:

Baptists
 Baptism
 Baptism, Infant
 Anabaptists
 Münzer, T.
 John of Leyden
 Mennonites
 River Brethren

Burrage, H. S.
 Conant, T. J.
 Hall, R.
 Lorimer, G. C.
 Peters, M. C.
 Ripley, H. J.
 Robinson, E. G.
 Spurgeon, C. H.
 Vedder, H. C.
 Wayland, F.

(f) LUTHERAN:

Lutheranism
 Reformation, The Protestant
 Luther
 Melancthon
 Augsburg Confession
 Greenwald, Emanuel
 Muhlenberg, H. M.
 Muhlenberg, J. P. G.
 Seiss, J. A.
 Stuckenberg, J. H. W.

(g) DUTCH REFORMED:

Reformed Church in America
 Belgic Confession
 Heidelberg Catechism (under
 Catechism)
 Dort, Synod of
 Classis
 Ferris, I.
 Riddle, M. B.

(h) QUAKER OR FRIENDS:

Friends
 Fox, George
 Penn, William
 Hicks, Elias
 Gurney, J. J.
 Wilbur, John

(i) UNITARIAN:

Unitarianism
 Arius
 Socinus
 Servetus, Michael

Biddle, John
 Priestley, Joseph
 Allen, J. H.
 Chadwick, J. W.
 Channing, W. E.
 Collyer, Robert
 Freeman, James
 Frothingham, O. B.
 Hill, Thomas
 Parker, Theodore
 Savage, M. J.
 Ware, Henry

- (j) UNIVERSALIST:
 Universalism
 Rely, James
 Murray, John
 Ballou, Hosea
 Hanaford, Phebe A.

- (k) MORMON:
 Mormons
 Smith, Joseph
 Pratt, Orson
 Rigdon, S
 Taylor, John
 Woodruff, W.
 Young, Brigham

- (l) OTHER DENOMINATIONS:
 Adventists
 Miller, William
 Christian Catholic Church
 Christians
 Christian Science
 Disciples of Christ
 Eddy, Mary Baker Glover
 Evangelical Alliance
 German Baptist Brethren
 German Evangelical Protestant
 Church
 German Evangelical Synod of
 North America
 Institutional Church
 Moravians
 Brethren, Bohemian

Huss, John
 Comenius, J. A.
 Zinzendorf, Nikolaus
 Reformed Church in the Unit-
 ed States.
 United Brethren in Christ
 Otterbein, P. W.
 Evangelical Association

III. MOHAMMEDANISM.

The history of Islam is closely connected with the history of the nations which adopted it as their creed. Though the spread of Mohammedanism has at all times been to some extent due to missionary zeal, its extension has largely been coincident with conquests. The political aspect of Moslem history may be best studied under the names of Mohammedan nations, dynasties, and rulers, such as ABBASIDES, OMMIADS, SELJUKS, TURKEY, ARABIA, etc. Here are only given the leading titles dealing with the religious development and present character of the faith.

For the Rise of Islam, see:

Mohammed
 Mohammedanism
 Mohammedan Sects
 Islam
 Mecca
 Medina
 Hejira
 Ayeshah

For the successors of Mohammed and early conquerors who spread the gospel of Islam in Asia, Africa, and Europe, see:

Caliph
 Abu-Bekr
 Omar.

Othman
 Ali
 Ommiads
 Khalid
 Musa ibn Nusair
 Amr ibn al-Asi
 Tarik
 Idrisites
 Aghlabids
 Fatimites
 Almoravides
 Almohades

For the tenets and practices of the faith, in addition to the titles already quoted, see:

Koran
 Sunna
 Hadith
 Kaaba
 Hajj
 Hajji
 Fast
 Ramadan
 Beiram
 Muharram
 Kiblah
 Houri
 Jinn
 Iblis

Imam
 Mufti
 Muezzin
 Ulema
 Madrasah
 Marabouts
 Mosque

For Sects and Parties, see:

Sunnites
 Shiites
 Hasan and Husain
 Mahdi
 Nosairians
 Assassins
 Druses
 Hakim ibn Allah
 Mutazilites
 Sincere Brethren
 Wahabis
 Dervish
 Babism
 Sufism
 Senussi

For Mohammedan Theologians:

Abu Hanifah
 Ibn Hanbal
 Ibn Tumart
 Ghazali

Chapter 7. Education

THE study of the science of education is peculiarly related to the study of the growth and development of the intellectual, moral, and spiritual life of the human race. Every department of knowledge is necessarily in some way connected with the science of education. Most of the great thinkers of all ages have contributed to the literature of the science, and consequently many names must be included in our list of educators which appear, as well, in some other field. As part of some one philosophical system or another, education goes back to early times, but its history as an independent science, separated from philosophy or theology, is quite recent. Its problems, too, have grown immeasurably more complex with the progress of democratic ideals and the widening of its sphere of interest. More even than national defense, the fostering of public education has come to be the great function of the modern State; and, though differences of opinion prevail as to how far this obligation extends in practice, in all progressive countries there is no class of men whom the government, in one way or another, does not attempt to supply with the means of education.

There are three sides from which students may approach the study of the science: the historical, the psychological, and the pedagogical.

The History of education is outlined in the Article EDUCATION, which traces its development from the dawn of civilization to the present day. A more detailed study of the subject may be systematically pursued in the following lists of articles. The subject is usually divided into four periods: Pre-Christian (including the Oriental and the Classical types), Early Christian, Mediæval, and Modern.

I. THE PRE-CHRISTIAN PERIOD.

(a) The several types of Oriental education are discussed in the following articles:

Confucius
Buddhism
Caste
Jews
Talmud
Rabbi
Mohammedanism
Ulema
Mufti
Madrasah

they strove to attain their ideals, are discussed under the following heads:

Sophists
Socrates
Plato
Aristotle
Xenophon
Cyropædia
Sparta
Games
Plutarch
Quintilian

II. THE EARLY CHRISTIAN PERIOD.

(b) The aims of Greek and Roman educators, and the methods by which

The part played by the early Christian Fathers in the furtherance of education and the establishment of schools will be found under:

Catechumens

Catechetical Schools

Chrysostom

Basil the Great

Clement of Alexandria

Origen

Theodore of Mopsuestia

For the struggle between the pagan and early Christian educators, see:

Tertullian

Augustine

These bring the student up to the Mediæval period.

III. THE MEDIÆVAL PERIOD.

In the series of articles dealing with this period, the student will find an account of the efforts made by the Church to promulgate education throughout Christendom, and will be led up to the modern movement, which properly co-extends with the movement that led up to and through the Reformation. See:

Monasticism

Benedictines

Arts, Liberal

Quadrivium

Trivium

Scholasticism

Charles the Great

Alcuin

Alfred the Great

Abélard

Chivalry

University

IV. THE MODERN PERIOD.

Educational progress was hastened and turned into varying channels by the revival of the old learning. The Reformation initiated the separation of education from theology, and, by breaking up the unit of European culture, gave rise to national systems of

education and the use of the national vernaculars as the medium of instruction. For the early educational reformers, see:

Renaissance

Humanism

Dante

Petrarch

Boccaccio

Poggio Bracciolini

Pico della Mirandola

Poliziano

Reuchlin

Erasmus

Budæus

Scaliger, J. J.

Scaliger, J. C.

Casaubon, I.

Hardouin, J.

Reformation, The Protestant

Luther

Melanchthon

Sturm, Johannes

Ascham, Roger

Rabelais

Montaigne

Bacon, Francis

Induction

Ratichius

Comenius

Orbis Pictus

The efforts of the Catholic Church to counteract the effects of the Reformation may be studied in the following articles:

Ignatius of Loyola

Jesuits

Ratio Studiorum

Jansenism

Port-Royal-des-Champs

For the activity of the Church in supplying education to the very young, see:

La Salle, Jean Baptiste de
Brothers of the Christian Schools

For writers who contributed to the advancement of the science of education, see:

Milton, John
Locke, John
Fénelon, François

The realistic movement in education begins with FRANCKE, and the Real-schule had its inception in his efforts. The movement culminates in the thorough sweeping away of old methods and ideas in education, foreshadowed in Rousseau's protest in his *Emile*. See:

Francke, A. H.
Rousseau
Emile
Basedow
Pestalozzi
Girard, J. B.
Jacotot
Fröbel
Kindergarten
Herbart
Mann, Horace
Spencer, Herbert
Arnold, Thomas
Bell, Andrew
Lancaster, Joseph

The systems of education prevalent in Europe and America are treated with great minuteness in the article on NATIONAL EDUCATION, SYSTEMS OF. The subject is further amplified in the sections on Education of the articles on the various countries of the world, wherein the statistical side is emphasized. The various phases of State activity receive full attention in the following articles:

Schools

Public Schools
Evening Schools
Secondary Schools
High Schools
Grammar Schools
Gymnasias
Realschule
Women, Education of
Negro Education
Industrial Schools
Vacation School
Education, Colonial

V. PEDAGOGY.

Pedagogy is that branch of the science of education which deals with the methods and means of carrying out educational ideas. The old and the new educational methods receive comprehensive treatment in the article PEDAGOGY, which is amply supplemented by the following articles:

Nature-Study
Child Psychology
Object Teaching
Curriculum
Kindergarten
Physical Education
Manual Training
Normal School
Education, Commercial
Technical Education
Professional Education
Theological Education
Medical Education
Legal Education
Agricultural Education
Seminar
Privat-Dozent
Reading
Spelling

VI. EDUCATIONAL INSTITUTIONS.

The growth of colleges and universities in Europe and America is treated from the general standpoint in the

article on **UNIVERSITY**. This is supplemented by separate accounts of all of the important colleges and universities in the world. The list of American colleges and universities is especially complete; to such an extent, indeed, that mention may be made of only a few of the most prominent.

See:

- University
- College
- Colleges, American
- Carnegie Foundation
- General Education Board
- Curriculum
- Elective Courses
- Degree
- Diploma
- Examination
- Fellowship
- University Extension
- Harvard University
- Yale University
- Princeton University
- Columbia University
- Pennsylvania, University of
- Brown University
- Cornell University
- Johns Hopkins University
- Clark University
- Chicago University
- Leland Stanford Junior University
- Catholic University of America
- Amherst College
- Bowdoin College
- Dartmouth College
- William and Mary College
- Williams College
- Girard College
- Carnegie Institution

The State universities have all been written up in detail.

For a group of women's colleges in the United States, see:

- Barnard College
- Bryn Mawr College
- Goucher College
- Mount Holyoke College
- Radcliffe College
- Smith College
- Vassar College
- Wellesley College

In this connection see also:

- Collegiate Education of Women
- Coeducation

For English universities and schools, see:

- Oxford University
- Rhodes Scholarships
- Cambridge, University of
- London University
- Liverpool, University of
- Manchester, University of
- National University of Ireland
- Dublin University
- Girton College
- Newnham College
- Eton College
- Rugby School
- Harrow School
- Shrewsbury School
- Winchester College

For the greatest of European universities, either in present importance or historically, see:

- Paris, University of
- Berlin, University of
- Vienna, University of
- Madrid, University of
- Munich, University of
- Moscow, University of
- Leipzig, University of
- Edinburgh, University of
- Heidelberg, University of
- Bologna, University of
- Padua, University of

Salerno, School of
Coimbra, University of
Salamanca, University of
Montpellier, University of
Prague, University of

A partial list of prominent educators of the modern times includes:

Adams, C. K.
Ames, J. B.
Andrews, E. B.
Angell, J. B.
Arnold, T.
Barnard, F. A. P.
Barnard, Henry
Bascom, J.
Brown, E. E.
Butler, N. M.
Clayton, P. P.
De Garmo, C.
Dewey, John
Drisler, Henry
Eliot, C. W.
Gildersleeve, B. L.
Gilman, D. C.
Hadley, A. T.
Hadley, James
Hall, G. S.
Hanus, P. H.
Harkness, A.
Harper, W. R.
Harris, W. T.
Hill, D. J.
James, E. J.
James, W.

Jebb, Sir R. C.
Jordan, D. S.
Jowett, B.
Low, Seth
Lyon, Mary
McCosh, J.
McMurry, F. M.
Monroe, Paul
Pattison, Mark
Patton, F. L.
Quick, R. H.
Sadler, M. E.
Schurman, J. G.
Sidgwick, Mrs.
Washington, Booker T.
Wendell, Barrett
West, Wm. A.
Wheeler, B. I.
White, A. D.
Whitney, W. D.
Wirt, Wm. A.
Young, Ella Flagg

For classes of institutions that have become centres for the spread of popular education, see:

(a) Libraries:

New York Public Library
Book
Alexandrian Library
Bodleian Library
British Museum
Bibliothèque Nationale
Library of Congress

(b) Museum

8. Philosophy and Psychology

THOUGH great diversity exists as to the meaning and scope of the term Philosophy, two definitions may be given as representative. The more modern view regards philosophy as the sum of all scientific knowledge, or the systematization of results obtained in the individual sciences; the historical and more prevalent view looks upon philosophy as the search for the ultimate nature and meaning of the universe, and especially of human life. Embracing at one time the totality of scientific knowledge, the field of philosophy has steadily grown narrower with the erection of independent sciences, until at the present day it includes the studies of metaphysics, logic, ethics, and æsthetics. Psychology is the latest branch of investigation to achieve its emancipation from philosophy, whose methods, historically, have been quite different from those that prevail in the scientific world to-day.

I. 1. The problems of philosophy are best studied, perhaps, historically. A brief summary, however, in necessarily technical language, will serve to present the main outlines of the subject in the form in which they have appeared to thinkers of different ages. Generally, then, the problems of philosophy are divided into three classes: those which deal with the ultimate nature of the universe, grouped under the heading **METAPHYSICS**; those which deal with the forms of human knowledge and its relation to reality, known as epistemology, or the theory of knowledge; and those dealing with human conduct, included in the science of ethics. See:

Philosophy
Metaphysics
Knowledge, Theory of
Ethics

2. The inquiry into the nature of reality takes on two forms: that concerned with the ultimate nature of things, and that dealing with the connection between things, or the architectural plan of the universe.

(a) For the First, see:

Ontology
Dualism
Monism
Materialism
Mechanism
Realism
Idealism

(b) For the Second, see:

Atomism
Theism
Transcendentalism
Pantheism
Body and Mind
Parallelism
Substance
Form
Causality
Time
Space
Teleology
Infinite
Absolute

3. In connection with our knowledge of the universe, two questions arise: (a) Taking the conglomeration of ideas we call knowledge, is there an outside Reality corresponding to them,

or are they Reality itself; and (b) are these ideas in origin the result of experience, or are they independent of experience? See:

- (a) Realism
 - Idealism
 - Skepticism
- (b) Empiricism
 - Rationalism
 - A priori
 - Dialectic
 - Category
 - Induction
 - Deduction

II. 1. The history of European philosophy begins with the Greeks, in whom, however, strong Oriental influences are traceable. Their earliest philosophy was a nature philosophy, and its two great problems were those of Being and Becoming. See:

Greek Philosophy
 Thales
 Anaximander
 Anaximenes
 Eleatic School
 Xenophanes
 Parmenides
 Zeno (the Eleatic)
 Gorgias
 Heraclitus
 Pythagoras
 Pythagoreanism
 Neo-Pythagoreanism
 Archytas
 Metempsychosis
 Empedocles
 Anaxagoras
 Atomism
 Leucippus
 Democritus

2. In the second period, the main interest of philosophy becomes anthro-

pological or ethical, the tendency being most fully apparent in the figure of the great teacher Socrates, from whom descend the great schools of the Hellenistic world, Platonists, Stoics, Hedonists, Cynics. Plato and Aristotle by their genius moulded almost the channels in which philosophic thought was to flow in the future. Greek philosophy, toward its end, exerted a powerful influence on Christianity. See:

Sophists
 Protagoras
 Socrates
 Hedonism
 Cyrenaic School
 Aristippus
 Hegesias
 Epicurus
 Epicureanism
 Lucretius
 Stoics
 Zeno (the Stoic)
 Cleanthes
 Chrysippus
 Seneca
 Epictetus
 Aurelius, Marcus
 Cynics
 Antisthenes
 Diogenes
 Euclid (of Megara)
 Plato
 Academy
 Arcesilaus
 New Academy
 Carneades
 Aristotle
 Peripatetic Philosophy
 Pyrrho
 Ænesidemus
 Sextus Empiricus
 Skepticism

Neo-Platonism

Philo Judæus

Ammonius

Plotinus

Porphyrius

Iamblichus

Proclus

Boëthius

Anima Mundi

Logos

Eclecticism

Cicero

3. From the Platonic philosophy, as contained in the writings of the Christian Fathers, mediæval philosophy developed into the system known as Scholasticism, which in its fullest development, however, became Aristotelian, through the influence of the Arabian philosophers. Philosophy became the handmaiden of theology, and it supported the mysteries of the Christian faith by means of a subtle dialectic. The downfall of scholasticism began with the fourteenth century, and was hastened by the Revival of Learning. See:

Scholasticism

Augustine (of Hippo)

Erigena

Rabanus Maurus

Peter Lombard

Realism

Anselm of Canterbury

Guillaume de Champeaux

Nominalism

Roscelinus

Durandus

Occam, William of

Buridan, Jean

Ailly, Pierre d'

Concept

Abélard

Averroës

Avicenna

Albert of Bollstädt

Alexander of Hales

Vincent of Beauvais

Aquinas, Thomas

Duns Scotus

Suárez, Francisco

Mysticism

Hugo of St. Victor

Bernard of Clairvaux

Bonaventura, St.

Eckhardt

Tauler

Kempis

Böhme

Quietism

Molinos

Bacon, Roger

Lully, Raymond

Cusa, Nikolas

Renaissance

The Revival of Learning brought about a temporary revival of the classic philosophies, but these served only to bridge over the chasm between the ancient thought and the modern philosophy, whose beginning dates from the establishment of Empiricism by Bacon and Rationalism by Descartes. The subjects of Substance and Causality now assume leading importance. Cartesian rationalism ends in dogmatism on the Continent; empiricism ends in skepticism in England. See:

Bruno, Giordano

Campanella, T.

Gassendi

Rationalism

Descartes

Malebranche

Occasionalism

Spinoza

Pantheism

Leibnitz

Preëstablished Harmony

Monad

Wolff, Christian

Baumgarten, A. G.

Eberhard, J. A.

Mendelssohn, Moses

Vico, G. B.

Empiricism

Hobbes, Thomas

Locke, John

Sensationalism

Clarke, Samuel

Butler, Joseph

Paley, William

Berkeley, George

Cambridge Platonists

Cudworth, Ralph

More, Henry

Hume, David

Charron, Pierre

Toland, John

Hartley, David

Priestley, Joseph

Condillac

La Mettrie

Diderot

D'Alembert

Helvétius

Holbach

Cabanis, J. P. G.

Genovesi, A.

Enlightenment, Philosophy of the
Common Sense, Philosophy of

Reid, Thomas

Beattie, James

Stewart, Dugald

Hamilton, William

The critical philosophy of Kant sought to mediate between Rationalism and Empiricism by assigning to either its proper function in the mental life; and, though Kantianism was followed by the rise of great rationalistic systems in Germany, in which the

balance was overthrown anew, the teachings of the Königsberg philosopher have shown the greater vitality as being in consonance with the spirit of the growing sciences. Reaction against unrestrained idealism led to Positivism, in which philosophy becomes a correlation of sciences. Materialism, after a brief popularity, seems to have passed away forever.

See:

Kant

Herder

Jacobi, F. H.

Hamann, J. G.

Krause, K. C. F.

Reinhold, C. E.

Rosenkranz, K.

Erdmann, J. E.

Trendelenburg

Zeller, E.

Ulrici, H.

Fischer, Kuno

For the important systems that arose after Kant, see:

Fichte, J. G.

Fichte, I. H.

Schelling

Hegel

Feuerbach, L. A.

Green, T. H.

And for a philosophy of will that has exercised a profound influence on modern thought:

Schopenhauer

Pessimism

Hartmann, Karl Robert

Materialism was fostered by the doctrine of evolution and the Darwinian discoveries. See:

Moleschott, J.

Büchner, F. L.

Vogt, Karl

Haeckel, E.

For the neo-Kantianism of the latest scientific thought, see:

Lange, F. A.
Cohen, Herman
Du Bois-Reymond, E. H.
Helmholtz
Virchow
Wundt
Renan
Taine

For systematic attempts at reconciling philosophy and religion, see:

Schleiermacher
Ritter, Heinrich
Rosmini-Serbat
James, Wm.

For philosophies that have been made the basis of important pedagogical psychologies, see:

Herbart
Flügel, O.
Benke
Lotze
Fechner
Paulsen, Friedrich

Spiritualism had influential exponents in France in the beginning of the nineteenth century. See:

Royer-Collard
Cousin, Victor
Maine de Brian
Jouffroy, T. S.
Psychical Research
Myers, F. W. H.

Spiritualism found its reaction in the epoch-making work of Comte. See:

Positivism
Agnosticism
Comte
Littré
Mill, J. S.

Spencer, Herbert
Lewes, G. H.
Harrison, Frederic
Richl, A.

For philosophic thought in America, see:

Edwards, Jonathan
Transcendentalism
Emerson, R. W.
Ripley, G.
Alcott, A. B.
Channing, W. E.
Thoreau, H.
McCosh, J.
Harris, W. T.
Royce, J.
James, Wm.
Ladd, G. T.
Dewey, J.

Every well-rounded philosophical system has its logic, ethics, and æsthetics, and strictly speaking these cannot be divorced from the discussions of purely metaphysical problems. Nevertheless, as important subdivisions of philosophy, they have received an amount of attention that give them independent consideration.

A. The problems of human conduct are discussed minutely in the general article on ETHICS, and further differentiated in subsidiary articles. See:

Ethics
Will
Free Will
Casuistry
Chance
Fatalism
Determinism
Indifferentism
Egoism
Altruism
Energism

Eudæmonism
 Intuitionism
 Categorical Imperative
 Utilitarianism
 Hutcheson
 Bentham, J.
 Austin, J. .
 Mill, J. S.
 Nietzsche, F.
 Stephen, Leslie
 Sidgwick, H.
 Martineau, J.
 Green, T. H.
 Caird, E.
 Alexander, Samuel
 Fouillée
 Simmel, G.

B. The formal rules of thought as outlined by Aristotle have received modifications at the hands of both rationalists and empiricists, the influence of the latter being, however, the more pronounced on the development of the science. See:

Logic
 Knowledge, Theory of
 Induction
 Deduction
 Argument
 Syllogism
 Analysis
 Synthesis
 Abstraction
 Hypothesis
 Judgment
 Definition
 Division
 Percept
 Concept
 Connotation
 Denotation
 Obversion
 Opposition
 Comparison

Analogy
 Identity, Law of
 Fallacy
 Dilemma
 Mill J. S.
 Jevons
 Whately, R.

C. The separate science of æsthetics dates only from the eighteenth century. Its latest development has been along experimental and anthropological lines. See:

Æsthetics
 Æsthetics, Experimental
 Baumgarten, A. G.
 Lessing, G. E.
 Shaftesbury, third Earl of
 Hogarth
 Bain
 Bosanquet
 Santayana, George

D. The psychology of the present differs from earlier investigations of the human mind in its application of a more rigorous scientific method. It assumes no metaphysical substratum for mental life, but is content to take experience as its ultimate fact and to study its forms and manifestations. Though the science is to be dated only from the latter half of the nineteenth century, it has already been found necessary to divide the field of investigation for the purpose of the more effective study of the mind of the adult, the child, and the abnormal individual, and the collective mind of the crowd. The method of psychology is ultimately introspective, but it is introspection carefully pursued and corrected by the standard of the scientific average. For classification and methods, see:

Psychology

Individual Psychology
 Genetic Psychology
 Child Psychology
 Social Psychology
 Folk-Psychology
 Insanity
 Psychology, Experimental
 Psychological Apparatus
 Psychophysics
 Introspection
 Phrenology

Intensity of Sensation
 Extension
 Duration
 Quality
 Discrimination, Sensible
 Contrast
 Reaction
 Weber's Law
 Limen
 Relativity, Law of

(c) For a Classification of Sensations,
see:

Vision
 Visual Sensation
 Blind Spot
 After-images
 Illusion
 Mirage
 Hallucination
 Clairvoyance
 Apparition
 Color
 Saturation
 Color-Blindness
 Audition
 Clang-Tint
 Colored Hearing
 Fusion
 Smell
 Taste
 Touch
 Cutaneous Sensations
 Static Sense
 Muscle Sense
 Muscle-Reading
 Pain
 Fatigue
 Common Sensation
 Organic Sensations

With mental experience as basis for analysis, psychology finds that the analytical element of mental life is sensation, and sensations depend on bodily processes set in motion by external stimuli. Sensations are classified according to the organs whose stimulation they accompany. For mind in general, and its relation to body, see:

(a) Mind
 Elements, Conscious
 Mental Process
 Self
 Self-Consciousness
 Unity of Consciousness
 Double Consciousness
 Sleep
 Dreaming
 Hypnotism
 Autosuggestion
 Somnambulism
 Consciousness
 Noetic Consciousness
 Meaning
 Body and Mind
 Subconsciousness
 Subliminal Consciousness
 Cerebration, Unconscious

(b) For Sensation, see:

Sensation
 Sensorium

From simple sensations the higher intellectual processes (perception, idea, association of ideas, etc.) are synthesized. A corresponding process has

been brought forward as the analytical element of our emotional life, and has been denominated Affection. From a combination of sensational and affective elements arise the various processes classified under the general designation, Will. It is thus that the new psychology improves upon the threefold division of Intellect, Reason, and Will in the older psychology. See:

Affection
Conation
Attention
Effort
Interest
Tendency
Disposition
Faculty
Mental Constitution

(a) For the Complex Sensational Processes:

Perception
Idea
Movement, Perception of
Locality, Perception of
Distance, Perception of
Figure
Rhythm
Melody
Association of Ideas
Retention
Reproduction of Ideas
Memory
Apperception
Recognition
Familiarity
Apprehension
Imagination
Judgment
Ratiocination
Understanding
Abstraction

Intellect

(b) For the Affective or Emotional Processes:

Feeling
Emotion
Mood
Temperament
Mental Constitution
Sentiment
Sympathy
Antipathy
Fear
Anger
Belief
Expectation
Expression
Laughter
Language
Gesture

(c) For the Will Processes:

Will
Action
Instinct
Impulse
Desire
Habit
Practice

In the field of experimental investigation, Germany holds the first rank. Excellent work has been done in France, especially in the field of abnormal psychology, and in England and America, where German thought has blended with the native empiricism. See:

(a) Weber, E. H.
Fechner, G. T.
Helmholtz, H.
Hering, E.
Flehsig, P. E.
Stumpf, K.
Müller, G. E.

Wundt, W.

(b) Bain, Alexander

Romanes, G. J.

Galton, F.

Stout, G. F.

Sully, James

(c) Binet, A.

Charcot, J. M.

Ribot, T. A.

(d) James, William

Ladd, G. T.

Münsterberg, H.

Dewey, John

Titchener, E. B.

Baldwin, J. M.

Hall, G. S.

Chapter 9. Language and Literature

THE tracing of the mutual relations of the various languages of the world, and the study of their similarities and differences, is the task of the science of comparative philology. The phonetic, or mechanical side, the inflectional, or constructive, and the syntactic, or psychological aspect, are the three factors which combine to form human speech. See:

A. Language

1. PHILOLOGY.

Philology
Grammar
Dialect
Phonetics
Accent
Phonetic Law
Grimm's Law
Verner's Law
Etymology
Grassman's Law
Inflection
Declension
Comparison
Nouns
Name
Gender
Adjective
Pronoun
Article
Adverb
Preposition
Conjunction
Interjection
Verb
Participle
Conjugation
Reduplication
Ablaut
Umlaut
Syntax, Figures of
Sentence
Semasiology

Slang
Metaphor
Orthography, Figures of
Prosody
Rhyme
Assonance
Alphabet
Inscriptions
Paleography
Runes
Spelling
Rhetoric
Pronunciation
Phonetics

2. For a classification of languages in related groups, see:

(a) *For the Monosyllabic Type:*

Chinese Language

(b) *For the Agglutinative Type:*

African Languages
Egyptian (under Egypt)
Coptic (under Copts)
Ural-Altaic
Finnish Language
Turkish Language
Japanese Language
Dravidians
Tamils
Telugus
Philippine Languages

(c) *For the Polysynthetic Type (Incorporating)*:

American Indian (under Indians, American):

(d) *For the Inflectional Type*:

Seimitic Languages

Cuneiform Inscriptions

Aramaic

Syriac Language

Samaritan Language

Moabitish Language (under Moabite Stone)

Arabic Language

Inflectional also are:

(i) Indo-Germanic Languages

(ii) The Languages of India:

Sanskrit

Pali

Prākṛit

Assamese (under Assam)

Bengali

Ceylonese (under Ceylon)

Gujarāṭi

Hindustani

Kashmiri

Maldiva

Marathi

Panjabi

Sindhi

Uriya

(iii) The Iranian Languages:

Iranian Languages

Old Persian

Avesta

Pahlavi

Persian

Afghan

Baluchi

Kurdish

Ossetic

(iv) Armenian

(v) Albanian

(vi) Mediterranean Languages:

Greek

Italic Languages

Latin

Italian

Spanish

Norman French

French

Provençal

Rumanian

Portuguese

(vii) The Teutonic Languages:

Teutonic Languages

Gothic

Icelandic

Norwegian

Swedish

Dutch

German

Plattdeutsch

Frisian

Flemish

Anglo-Saxon

English

Americanisms

(viii) The Celtic Languages:

Celtic Languages

Cornish

(ix) The Balto-Slavic Languages:

Old Prussian

Lettic

Lithuanian

(x) The Slavic Languages:

Slavic Languages

Old Church Slavic

Polish

Russian

Czech or Bohemian Language

See also:

International Languages

Esperanto

Volapük

3. For the great names in the field of comparative philology, see:

Ascoli, G. I.
Bopp, F.
Brugmann, F. K.
Breal, M.
Bugge, S.
Burnouf, E.
Grimm, J. L. K.
Grundtvig, S. H.
Kölbing, E.
March, F. A.
Menéndez Pidal, R.
Meillet, A.
Paris, G.
Pott, A. F.

Rask, R. K.
Roussetot, Abbé
Schlegel, F.
Schleicher, A.
Schmidt, J.
Sievers, E.
Skeat, W. W.
Stokes, W.
Sweet, H.
Thomas, André Antoine
Taylor, W.
Verner, K. A.
Vigfusson, G.
Webster, Noah
Whitney, W. D.
Zeuss, S. C.

B. Literature

Literature, which is the expression, more or less permanent, in language, of human thought and emotions, would include in its widest sense every written record of man's activity, the university man's dissertation on the Coleoptera no less than Shelley's "Ode to the Skylark." Such a wide connotation of the term would render any classification within reasonable space limits impossible, and in the present chapter the matter has been restricted to the treatment of what we ordinarily call *Belles-lettres*. The great works in history and the various fields of science and philosophy will be accounted for in the chapters with the subject matter of which they are more intimately connected. A more considerable difficulty than that of settling limits to the scope of the term literature is that of determining a reasonably fixed standard of classification, owing to the twofold aspect under which

every literary monument presents itself—as form or matter. Taking, for instance, any specific department of literature, such as satire, we find that our satirist may be, as regards form, a lyrist, novelist, essayist, or dramatic writer. The man we call poet may, in the same manner, have turned the poetic form to the uses of comedy or of the lyric spirit. Again, commonly, a literary artist will have attained eminence in different categories of literature, as the drama, say, criticism, and poetry, and the necessity arises of partially and often arbitrarily characterizing such a man. A certain measure of violence is, therefore, unavoidable when the attempt is made to cast any great literary figure into a rigidly labeled department; but there is sufficient justification for the scheme in the fact that, as a rule, the great literary figure does stand out pre-eminently in one department of the art,

and, remembering that the line of division is by no means rigid, we may classify him accordingly.

The historical study of literature may be pursued in two ways. There is the vertical order, as it may be called, in which we take up the national literatures one by one, a method of study in which the various literary genres are considered at the same time, and wherein the formal side is naturally subordinated to the investigation of the development of national character as revealed in the national literature. There is also what may be called the horizontal order, where our attention is confined to one kind of literature at a time, whose development is traced from the beginning to the present day, across national boundaries, the process essentially being one of thematic unity, as compared with the preceding method of national unity. Either method has its advantages, and the material in the *New International Encyclopædia* has been so treated as to lend itself to either form of study; but, whereas the student or reader who would devote himself to the study of national literatures may be left to his own resources in view of the obvious classification followed, the need for guidance is apparent in the second. Emphasis, therefore, in the present chapter is laid on the formal development of the literary form, the underlying principle being the belief that the larger number of students are apt to turn to a specialized subject, like the history of the novel or the epic, rather than to the expanded story of an entire national literature.

I. THE NATIONAL LITERATURES.

American Literature

Arabic Language and Literature
 Armenian Language and Literature
 Australian Literature
 Bengali Language and Literature
 Breton Literature
 Canadian Literature
 Catalan Language and Literature
 Chinese Language and Literature
 Cuban Literature
 Czech Literature
 Danish Language and Literature
 Dutch Literature
 Egyptian Language and Literature
 (under Egypt)
 English Literature
 Finnish Language and Literature
 Flemish Language and Literature
 French Literature
 Frisian Language and Literature
 German Literature
 Greek Literature
 Hindustani Language and Literature
 ture
 Hungarian Literature
 Icelandic Literature
 Iranian Languages and Literatures
 Irish Literature
 Italian Literature
 Japanese Literature
 Jewish Language and Literature
 (under Jews)
 Latin Literature
 Lettic Language and Literature
 Lithuanian Language and Literature
 ture
 Mexican Literature
 Norwegian Literature
 Old Church Slavic Language and
 Literature
 Pahlavi Language and Literature
 Persian Literature
 Polish Literature
 Portuguese Literature
 Portuguese-Brazilian Literature

Romance Literatures

Rumanian Language and Literature

Russian Literature

Scottish Language and Literature

Spanish Literature

Spanish-American Literature

Swedish Language and Literature

Syriac Language and Literature

Turkish Language and Literature

Yiddish

II. THE LITERARY FORMS. The broadest subdivision in literature according to form is that into prose and poetry; and, though it is often very difficult to differentiate one from the other in fact, and always hard to describe the distinction between them in theory, the common definitions of prose as the ordinary mode of speech and poetry as speech figurative, cadenced, and cast within certain comparatively rigid forms, may be followed safely enough for practical purposes. Either, taken in itself, may be subdivided into forms of narrower connotation, such as essay and novel under prose, epic and lyric under poetry. Here, however, appears the inconsistency already mentioned as inherent in literary classification; for the earliest scientific essays of the Greeks were written in verse, while Walt Whitman's lyric spirit finds expression in a medium closely akin to Ruskin's fervid prose. Again, the drama is probably nowadays regarded as a prose form, though as a matter of fact the world's greatest plays bear the poetic form. Poetry, then, if we exclude the drama, embraces the two subdivisions of the epic and the lyric. In the history of literary development, poetry precedes

prose, and of the two poetic forms the epic, as a rule, antedates the lyric.

1. EPIC POETRY. The epic may be defined as a lengthy narrative in verse, dealing with a subject of great magnitude in character, national or descriptive of a great movement. A distinction may be made between the epic which is the spontaneous expression of national life, constructed at an early period in national development out of pre-existing minor poetic forms, and the artificial epic of a more advanced cultural stage, which is the work of a single mind and in consequence purposive in its nature rather than spontaneous. Mention should also be made of the mock or beast epic, in nature largely satirical. See EPIC POETRY; and, for the great epics and epic poets of the world's literature, the following titles:

SANSKRIT:

Mahabharata

Rāmāyana

Purana

PERSIAN:

Firdausi

Shah Namah

Rustam

GREEK:

Homer

Age of Epic Poetry (under Greek Literature)

Cyclic Poets

LATIN:

Vergil

Æneas

Lucan

Silius Italicus

Statius

FRENCH:

Chansons de geste

Roland

Aymon

SPANISH :

Cid, The

Ercilla y Zúñiga

GERMAN :

Nibelungenlied

Klopstock

ITALIAN :

Dante

Boiardo

Ariosto

Tasso

PORTUGUESE :

Camões

NORSE :

Edda

Saga

FINNISH :

Kalevala

ENGLISH :

Beowulf

Milton

THE BEAST EPIC :

Homer; Greek Literature

Reynard the Fox

2. THE LYRIC. Lyric poetry, as the expression of personal feeling, is the most subjective of all literary forms. Originally written to be sung, the lyric has remained the nearest approach in literature to absolute music. Its scope is as wide as human emotion, broadening in the course of its development with the expansion of human sympathies. Its formal variations are numerous. See:

Lyric Poetry

Versification

Sonnet

Ode

Ballade

Rondeau

Madrigal

Canzone

Rhyme

Vers Libre

Lyric poetry attained great perfection in ancient Greece, though its field was narrower than that of modern poetry for comparative lack of the nature element, which, with us, is so conspicuous a feature of lyric expression. The Roman genius was, on the whole, unfavorable to the fostering of the lyric spirit. In the East, Persia produced a succession of poets of great excellence. See, for the great names in the realm of lyric poetry:

SANSKRIT :

Kalidasa

PERSIAN :

Nizami

Omar Khayyam

Sadi

Hafiz

Jāmi

LATIN :

Catullus

Tibullus

Horace

Ovid

Propertius

Ausonius

Prudentius

GREEK :

Alcman

Callinus

Archilochus

Tyrtæus

Simonides

Solon

Alcæus
Sappho
Anacreon
Theognis
Hipponax
Pindar
Bacchylides
Timotheus
Theocritus
Bion
Moschus
Herondas

The lyric poetry of the Middle Ages was largely ecclesiastical, the Latin hymns of the period being especially marked by extraordinary effects of rhyme. The court singers of France and Germany, however, fostered the love theme assiduously. With the Revival of Learning came a great impetus to the poetic expression of secular emotions, Italy being the first to feel the impulse of the new movement. Lyricism languished during the domination of classical ideals in the seventeenth and eighteenth centuries, but, freed from the bond of artificiality, entered upon an unprecedented development towards the end of the latter century. See:

Hymnology
Troubadours
Trouvère
Minnesinger
Meistersinger
Goliardic Literature
Romanticism;

and for the lyric poets of Western Europe:

FRENCH:

Marie de France
Meung, Jean de
Villon

Marot
Malherbe
Pléiade
Ronsard
Chénier, Andre Marie
Chénier, Marie Joseph
Béranger
Lamartine
Delavigne
Hugo
Musset
Gautier
Leconte de Lisle
Baudelaire
Hérédia, José
Sully-Prudhomme
Verlaine
Mallarmé
Regnier, H.
Rimbaud, J. A.
Kahn, Gustave

PROVENÇAL:

Roumanille
Jasmin
Mistral, F.
Gras, Félix
Félibrige

ITALIAN:

Cavalcanti, Guido
Cino da Pistoja
Dante
Petrarch
Colonna, Vittoria
Guarini
Marini
Chiabrera
Metastasio
Bondi, Clemente
Foscolo, Ugo
Leopardi
Monti, V.
Aleardi
Giusti, Giuseppe

Carducci

Graf, A.

SPANISH :

Lopez de Ayala, Pedro

Santillana

Carcilasso de la Vega

León, Luis de

Figuerola, Francisco de

Argensola

Mendoza, Diego Hurtado de

Góngora y Argote

Zorrilla y Moral

Iriarte y Oroposa

Lista y Aragon

Melendez Valdes

Espronceda

PORTUGUESE :

Ferreira, A.

Gomes de Amorim

GERMAN :

Walther von der Vogelweide

Sachs, Hans

Fleming, Paul

Opitz

Bürger

Kleist, E. C.

Goethe

Schiller

Schlegel, A. W.

Arndt

Novalis

Chamisso

Uhland

Körner

Eichendorff

Heine

Rückert

Freiligrath

Bodenstedt

Scheffel

Auersperg

Hamerling

Ambrosius, Johanna

DUTCH :

Marnix

Vondel

Bilderdijk

Kate, J. J. ten

Eeden, F. Van

FLEMISH :

Maerlant

Bijns

Conscience, H.

The lyric poetry of Northern and Eastern Europe is recent in origin, dating from the eighteenth century. It has, as a rule, been under the influence of the great literary movements of the West, but, though largely mimetic in form, has been made the expression of national consciousness. See :

SWEDISH :

Bellman

Tegnér

Atterhom

Runeberg

Snoilsky

DANISH :

Heiberg, J. L.

Evald

Richardt

NORWEGIAN :

Welhaven

Wergeland

HUNGARIAN :

Kisfaludy

Arany

Petőfi

Erdélyi

RUSSIAN :

Derzhavin

Pushkin

Koltsov

Lermontov

Sheftchenko

Nekrasov

POLISH :

Naruszewicz
Karpinski
Mickiewicz
Kniaznin
Slowacki
Krasinski
Pol
Asnyck

The origins of the English lyric poetry may be traced back, if it be so desired, to early Anglo-Saxon times. The continuous history begins with Chaucer. Some of the most beautiful lyrics of the language are embodied in the works of the Elizabethan dramatists, after whom, and Milton, the art declines and hardens until revived by Burns and Wordsworth. English lyric in the nineteenth century has covered the field of human sympathies, from Blake's unseen world to Tennyson's studies in evolution and Kipling's in machine construction. See:

ENGLISH :

Cædmon
Ormulum
Layamon
Lydgate, John
Minot, Laurence
Barbour, John
Gower
Chaucer
Sackville
Shakespeare
Jonson
Milton
Ramsay, Allan
Donne
Herrick
Herbert
Waller
Crashaw

Cowley
Vaughan
Gay
Savage, Richard
Chatterton
Shenstone
Young, Edward
Thomson
Gray
Collins
Cowper
Blake
Burns
Hogg
Wordsworth
Landor
Moore
Keats
Shelley
Percy
Proctor, B. W.
FitzGerald
Tennyson
Browning
Clough
Arnold, Matthew
Ingelow, Jean
Patmore
Rossetti, Dante Gabriel
Rossetti, Christina
Morris
Arnold, Edwin
Swinburne
Massey, G.
Henley
Watson, W.
Kipling
Meynell, A. C.
Sharp, W.
Yeats, W. B.

AMERICAN :

Freneau
Barlow, Joel

Key
Halleck
Bryant
Drake
Emerson
Whittier
Longfellow
Holmes
Poe
Lowell
Hoffman, C. F.
Whitman
Cary, Alice and Phæbe
Timrod
Howe, Julia Ward
Stedman
Aldrich
Lanier
O'Reilly, J. B.
Field, Eugene
Riley
Miller, Joaquin
Moody, William Vaughan

chant, to complete secularization of the drama. The principles of the drama as propounded by Aristotle have remained for the most part the same; the mechanical technique has varied widely from original conditions. See:

Drama
Theatre
Stage
Chorus
Act
Ballet
Burlesque
Farce
Interlude
Masque
Vaudeville
Pantomime
Puppet
Atellana
Mime
Prologue
Epilogue

3. THE DRAMA. The Drama has been placed high among mimetic forms, because of the contribution it lays on the other arts, thus combining within itself their several qualities. Action and character are the subject matter. The means are bodily motion, which gives the sculptor's effect; language, which is the instrument of the poet; music, and scenery, and costume, to which painting and architecture give their share. The origins of the drama are to be found, most probably, in early religious ceremonial. Festivals marked by singing and dancing, the latter more or less symbolic in character, are common to peoples in a primitive stage; and the line of progress is along the development of the action and the spoken dialogue, at the expense of the

Greek drama had its origin in the worship of Dionysus. With Æschylus, tragedy is profoundly religious, and the actor's speeches are still subordinated to the choruses; Sophocles strengthened the element of action; Euripides thoroughly humanized tragedy. Attic comedy was fierce in personal satire and unbridled in speech. The Latin drama was sedulously modeled on the Greek. The origin of the Sanskrit drama is disputed, some deriving it from the Greek, others assigning it an independent development. See, for writers and plays:

SANSKRIT:
Śūdraka
Kalidasa
Bhavabhūti
Śakuntalā
Mricchakatika

GREEK:

Æschylus
Phrynichus
Sophocles
Euripides
Aristophanes
Agathon
Epicharmus
Eupolis
Menander

LATIN:

Plautus
Terence
Seneca

In Mediæval times, practically the only species of dramatic performance was the religious spectacles of the Church, in which the purpose was didactic. See: MIRACLE PLAY; MORALITY; INTERLUDE; PASSION PLAY.

Out of the religious performances of the Middle Ages the modern drama developed. In France, which served as a model to the Continent, an elaborate system of rules was built up, supposedly bringing the drama into conformity with the standards of the classic age. The classic ideals, with their restriction of human emotions to kings and nobles, were overthrown on the Continent in the first half of the nineteenth century, since when the scope of the drama has been widened to embrace the entire complex of society. Like the novel, the drama of the latest days has become largely purposive. See, for the writers:

FRENCH:

Mairet
Regnard
Corneille
Racine
Molière

Marivaux

Chénier, M. J.
Crébillon
Beaumarchais
Scribe
Vigny
Hugo
Legouvé
Labiche
Ponsard
Augier
Dumas
Pailleron
Meilhac
Halévy
Sardou
Rostand
Maeterlinck
Brieux
Comédie Française

ITALIAN:

Trissino
Maffei
Goldoni
Gozzi
Alfieri
Manzoni
Giacometti
Annunzio, G. d'

SPANISH:

Encina
Vega Carpio
Calderon de la Barca
Moreto y Cabaña
Moratín, Leandro Fernández
Gil y Zárate
Lopez de Ayala, Adelardo
Hartzenbusch, J. E.
Echegaray
Breton de los Herreros

PORTUGUESE:

Sá de Miranda
Almeida-Garrett

The primacy in Continental drama, long held by the French, is disputed at the present day by the Teutons and the Slavs, more particularly the Scandinavian branch of the Teutons. See:

GERMAN:

Lessing
Goethe
Schiller
Kotzebue
Grillparzer
Laube
Gutzkow
Anzengruber
Heyse
Sudermann
Hauptmann
Lindau, P.
Hartleben
Fulda

SWEDISH:

Almqvist
Strindberg

DANISH:

Holberg
Oehlenschläger

NORWEGIAN:

Ibsen
Björnson

RUSSIAN:

Sumarokov
Griboedov
Gogol
Ostrovski
Zagoskin, M. N.
Tolstoy, Alexei
Tolstoy, Liou
Gorky

POLISH:

Fredro
Kniaznin
Fredro the Younger

HUNGARIAN:

Kisfaludy, Károly
Katona
Szigligeti

While Continental Europe was enslaved by the rigid formulas of the classicists, in England the Romantic drama flourished from the beginning. The Elizabethan age is the golden age of the drama of the world. Following the Elizabethans came the decline, arrested partially by the talent of Dryden and Congreve during the Restoration, and of Goldsmith and Sheridan in the later part of the eighteenth century. In the nineteenth century, England brought forth no dramatic writer of conspicuous genius. See:

ENGLISH:

Udall
Norton
Sackville
Kyd
Lodge
Peele
Marston
Greene
Marlowe
Shakespeare
Nash
Dekker
Middleton
Jonson
Massinger
Beaumont and Fletcher
Ford
Webster
Davenant
Dryden
Wycherley
Otway
Congreve
Farquhar
Goldsmith

Sheridan
 Knowles, J. S.
 Beddoes, T. L.
 Taylor, Tom
 Robertson, T. W.
 Sims, G. R.
 Boucicault
 Pinero
 Jones, H. A.
 Shaw, George Bernard
 Phillips, Stephen
 Barrie, J. M.
 Galsworthy, John
 Synge, J. M.
 Masefield, John

AMERICAN :

Dunlap, William
 Payne, John Howard
 Brougham, John
 Boker
 Sargent, Epes
 Carleton, Henry Guy
 Howard, Bronson
 Campbell, Bartley
 Thompson, Denman
 Harrigan, Edward
 Belasco, David
 Fitch, William Clyde
 Moody, William Vaughan

A partial list of the more noteworthy actors, of all times and all nations, is as follows:

Anderson, Mary A.
 Archer, Belle
 Arnould, Sophie
 Arthur, Julia
 Bancroft, Mary E. W.
 Barrett, Wilson
 Barry, Elizabeth
 Barry, Spranger
 Bates, Blanche
 Bellamy, George Anne
 Bernhardt, Sarah

Betterton, Thomas
 Betty, W. H. W.
 Booth, Agnes
 Booth, Barton
 Booth, Edwin
 Booth, Junius Brutus
 Bracegirdle, Anne
 Burbage, Richard
 Campbell, Beatrice
 Clarke, J. S.
 Clive, Catherine
 Coghlan, Charles
 Coghlan, Rose
 Coquelin, B. C.
 Crane, W. H.
 Cushman, Charlotte
 Davenport, E. L.
 Davenport, Fanny
 Déjazet, P. V.
 Devrient, L.
 Drew
 Duse
 Farren, Elizabeth
 Fisher, Charles
 Fiske, Minnie M.
 Florence, W. J.
 Forbes-Robertson, J.
 Forrest, Edwin
 Garrick, David
 Gilbert, J. G.
 Gillette, W. H.
 Goodwin, N. C.
 Haase, F.
 Hackett, James H.
 Hading, Jane
 Hare, John
 Haworth, Joseph
 Herne, James A.
 Irving, Henry
 Janauschek, Fanny
 Jordan, Dorothy
 Kean, Edmund
 Kean, C. J.
 Kemble, Chas.

Kemble, Frances Anne
 Kemble, John Philip
 Kendal, Mr.
 Kendal, Mrs.
 Lecouvreur, Adrienne
 Lemaître, A. L.
 McCullough, J. E.
 Macklin, Charles
 Macready, W. C.
 Mansfield, Richard
 Mathews, Charles
 Mathews, C. J.
 Modjeska, H.
 Morris, Clara
 Mounet-Sully
 Oldfield, Anne
 Payne, J. H.
 Placide, H.
 Rachel, Mlle.
 Rehan, Ada
 Réjane, Mme.
 Ristori, A.
 Robson, Stuart
 Roscius
 Russell, Sol Smith
 Salvini, A.
 Salvini, T.
 Siddons, Sarah
 Sonnenthal, A.
 Sothorn, E. H.
 Stoddart, J. H.
 Thompson, Denman
 Tree, Beerbohm
 Vestris, Mme.
 Wallack, J. L.
 Wallack, J. W.
 Willard, E. S.
 Woffington, Margaret
 Wyndham, Charles

4. THE NOVEL. The novel, at present the most flexible of literary forms, though of recent date in its present character, traces back to early and multiple sources. The beast tale,

common to all nations, the narrative of adventure, and the story of things supernatural, were the precursors of the novel. The love element becomes pronounced in the old Greek romances and assumes primary importance in the romances of the Middle Ages. The romance, it may be broadly put, passed into the novel, when the tale began to assume the character of a picture of contemporary life, a development to be assigned to the sixteenth century. See the article NOVEL.

The great monuments and figures of pre-modern story-telling are the following:

SANSKRIT:

Dandin
 Subandhu
 Bana

ARABIC:

Arabian Nights

GREEK AND ROMAN:

Heliodorus
 Ephesiaca
 Daphnis and Chloe
 Apuleius
 Apollonius of Tyre
 Petronius

In Mediæval times, the romance flourished, combining in itself elements of the epic, the beast fable, and the tale of adventure and of love. Materials were largely drawn from ancient history, and the stories gathered around great figures of antiquity and the early Middle Ages. See:

Romance
 Fabliaux
 Gesta Romanorum
 Alexander, Legend of
 Charlemagne Cycle of Romances

Chrestien de Troyes
 Wace
 Roman de la Rose
 Perceval
 Tristram
 Lancelot of the Lake
 Malory
 Grail, The Holy
 Merlin
 Chaucer
 Morte d'Arthur
 Euphues
 Amadis of Gaul

Romance lacked characterization and reality. With the appearance of tales embodying observation of real types and description of manners, the novel as it is to-day begins. The origin is generally placed in Spain, where the rise of the picaresque tale marks the first step in character delineation. The subsequent development is rapid to present conditions, when the novel has become the all embracing term for all prose fiction, realistic, romantic, adventurous, or didactic. See for the writers:

FRENCH:

Scudéry, Madeleine de
 Lafayette, Marie Madeleine de
 Scarron
 Lesage
 Voltaire
 Genlis, Countess de
 Prévost d'Exiles
 Saint-Pierre
 Stendhal
 Balzac
 Hugo
 Dumas, the Elder
 Sue
 Erckmann-Chatrian
 Kock, Paul de

Sand, George
 Merimée, P.
 Flaubert
 Goncourt
 Feuillet
 Daudet
 Loti, Pierre
 Zola
 Bourget
 Margueritte, P.
 Prévost, E. M.
 France, Anatole

ITALIAN:

Boccaccio
 Manzoni
 Amicis
 Fogazzaro, A.
 Verga, G.
 Annunzio, Gabriele d'
 Farina, S.
 Serao, Matilda

SPANISH:

Cervantes
 Aleman
 Valera y Alcalá Galiano
 Galdos
 Palacio Valdés
 Alarcón
 Pereda
 Pardo Bazán

GERMAN:

Goethe
 Fouqué
 Gutzkow
 Eichendorff
 Alexis, W.
 Hauff
 Laube
 Auerbach
 Reuter, Fritz
 Tieck, L.
 Freytag
 Storm, Theodor

Scheffel
Gerstäcker
Spielhagen
Anzengruber
Dahn
Heyse
Ebers
Frenssen

SWEDISH :

Rydberg
Bremer, Frederika
Strindberg

DANISH :

Blicher
Drachmann

NORWEGIAN :

Björnson
Lie
Kielland

HUNGARIAN :

Jókai
Eötvös

RUSSIAN :

Gontcharov
Pisemski
Gogol
Turgenev
Dostoyevsky
Tolstoy
Korolenko
Gorky
Chekhov

POLISH :

Kraszewski
Sienkiewicz
Orzeszkowa

Defoe began the line of great English novelists with what is still the greatest story of adventure in our literature. Fielding then perfected the form. Manners were acutely

studied by a succession of women writers, who bridged the eighteenth and nineteenth centuries. Barren practically of the drama, the latter century found expression in the novel to as fully great an extent as in lyric poetry. See:

ENGLISH :

Behn, Afra
Defoe
Sterne
Smollett
Fielding
Richardson
Inchbald, Elizabeth Simpson
Godwin
Burney, Frances
Radcliffe, Ann
Edgeworth, Maria
Scott
Austen, Jane
Porter, Jane
Peacock, Thomas Love
Lover, Samuel
Borrow
Lever, Charles
Bulwer-Lytton
Gaskell, Elizabeth
James, G. P. R.
Thackeray
Marryat, Frederick
Dickens
Reade
Trollope
Kingsley, Charles
Eliot, George
Brontë, (Charlotte, Emily, Anne)
Collins, Wilkie
Blackmore
Oliphant, Margaret
Meredith, George
Morris, William
Du Maurier
Black, William

Hardy, Thomas
 Stevenson, Robert Louis
 Russell, W. C.
 Ward, Mrs. Humphry
 Moore, George
 Hawkins, Anthony Hope
 Kipling, Rudyard
 Conrad, Joseph
 Gissing, George
 Hewlett, Maurice
 Quiller-Couch, A. T.
 Wells, H. G.
 Bennett, Arnold
 Galsworthy, John

The nineteenth century produced in America in the realm of fiction a master romancer, Cooper, two masters in their art, Hawthorne and Poe, and at least two talented exponents of modern realism, James and Howells. See:

Brown, Charles Brockden
 Cooper
 Poe
 Hawthorne
 Hale, E. E.
 Howells
 Harte, Bret
 James, Henry
 Cable, George Washington
 Fawcett, Edgar
 Grant, Robert
 Jackson, H. H.
 Melville, Herman
 Tourgee, A. W.
 Wilkins, Mary
 Allen, James Lane
 Page, Thomas Nelson
 Garland, Hamlin
 Stockton, Frank R.
 Norris, Frank
 Atherton, Gertrude
 Wharton, Edith

5. CRITICISM AND ESSAY.

1. The principles underlying artistic endeavor have been discussed since early Greek times, and may be divided into two classes, the universal laws of artistic expression, which have always been accepted, and the minor theories, more limited in scope and applying generally to individual arts, which never have been accepted by all, and never will be. Plato first studied in a thorough manner the relations of art to reality. Aristotle's *Poetics* laid down the principles that have undergone no essential change since his time. On the other hand, the blending of the classic spirit with the Teutonic, and the subsequent rise of chivalry and romance, produced differences of opinion regarding subject, scope, and manner that are in full force at the present day. See:

Criticism
 Realism and Naturalism
 Romanticism
 Impressionist School of Painting
 Décadents
 Symbolists

2. Criticism in the beginning found expression in both prose and verse; the modern tendency has been decidedly towards prose, though there is not wanting a Pope's *Essay on Criticism* to continue the succession from Horace's *Ars Poetica*. The usual form, then, in which criticism at present finds expression is the Essay. See: ESSAY, and for the writers:

GREEK:

Plato
 Aristotle
 Plutarch
 Longinus

LATIN :

Cicero
Horace
Seneca the Elder
Varro
Pliny
Quintilian

FRENCH :

Montaigne
Saint-Évremond
Corneille
Boileau
Voltaire
Diderot
Bayle
Taine
Cousin
Lamartine
Sainte-Beuve
Michelet
Sarcey
France, Anatole
Faguet, Émile
Brunetière
Lemaître, Jules
Gourmont, Rémy de

ITALIAN :

Dante
Boccaccio
Poliziano
Vida
Scaliger, J. C.
Carducci, Giosuè
De Sanctis, F.
Gubernatis, A.
Croce, B.

GERMAN :

Reuchlin
Winckelmann
Gottsched
Herder
Lessing
Schiller

Schlegel, Friedrich

Grimm

Scherer, W.

Menzel

Bahr, Hermann

Nordau, Max

DUTCH :

Erasmus

DANISH :

Rafn

Brandes

RUSSIAN :

Belinsky

Pisarev

ENGLISH :

Ascham

Sidney

Bacon, Francis

Dryden

Steele

Addison

Swift

Johnson

Pope

Jeffrey

Coleridge

Wordsworth

Lamb

Hazlitt

Wilson, John

De Quincey

Hunt, J. H. Leigh

Carlyle

Ruskin

Arnold, Matthew

Rossetti, W. M.

Stevenson, Robert Louis

Pater, W.

Symonds, J. A.

Saintsbury, George

Stephen, Leslie

Dowden, Edward

Archer, William

Gosse, Edmund

Shaw, G. B.

AMERICAN :

Irving

Emerson

Ticknor, G.

Lowell

Fuller, Sarah Margaret

Curtis, G. W.

Whipple

White, Richard Grant

Hutton, Laurence

Mabie, Hamilton

Woodberry, George Edward

Winter, William

6. MORALISTS, SATIRISTS, AND HUMORISTS.

The study of human character and conduct has at all times received the attention of great minds, and what may be called ethical literature forms a very important part of the literature of the world. Near to constructive moralists, like Epictetus or Carlyle, stands the satirist, whose mission it is to combat the evil of degenerate times. The contemplation of the petty faults and incongruities of human character and action, so portrayed as to arouse laughter without arousing deep emotion of any kind, has always been a universal source of amusement. See:

GREEK AND ROMAN :

Aristophanes

Lucian

Epictetus

Ennius

Lucilius

Horace

Juvenal

Martial

Persius

Lucan

Tacitus

Petronius

Aurelius, Marcus

FRENCH :

Rabelais

Ménippée

La Bruyère

La Rochefoucauld

Pascal

Lesage

Voltaire

Chamfort, S. R.

France, Anatole

ITALIAN :

Jacopone da Todi

Aretino

SPANISH :

Quevedo y Villegas

GERMAN :

Fischart, Johannes

Brant

Hutten, Ulrich von

Epistolæ Obscurorum Virorum

Grimmelshausen

Rabener

Lichtenberg

Wieland

Tieck

Richter, Johann Paul

Reuter, Fritz

DUTCH :

Erasmus

Marnix

RUSSIAN :

Kantemir

Shtchedrin

Nekrasov

ENGLISH :

Langland (*Piers Plowman*)

Skelton

Bunyan

Butler

Dryden
 Pope
 Swift
 Junius, Letters of
 Arbuthnot
 Byron
 Carlyle
 Smith, Sydney
 Thackeray
 Dickens
 Calverley
 Gilbert, W. S.
 Mallock, W. H.
 Lear, Edward
 Jerome, Jerome K.
 Shaw, G. B.

SCOTCH:

Dunbar
 Barclay

AMERICAN:

Ward, Nathaniel
 Franklin
 Irving
 Lowell
 Holmes
 Smith, Seba
 Clemens, S.
 Leland, C. G.
 Locke, D. R.
 Browne, C. F.
 Bunner, H. C.
 Shaw, H. W.
 Stockton, F. R.
 Nye, E. W.
 Dunne, Finley Peter

7. ORATORY.

The art of eloquent persuasion is found among all primitive peoples where social bonds have become of some importance. Oratory attains its fullest development in the Greek democracies, where the citizen was called upon to take so considerable a share in the

public life. The political and juristic genius of the Roman was likewise favorable to the development of the art. Pulpit eloquence had some of its greatest masters among the early Fathers of the Church, which has never been wanting in masterly exponents of its doctrines. A great period in the history of oratory was the age of the French Revolution, when, contemporaneously in England too, a succession of great orators lent lustre to the reign of George III. In the United States, the revolutionary period, and the period of rapid national growth, produced a brilliant series of orators, culminating in the classic triad, Clay, Webster, and Calhoun. At present oratory may be considered a declining art, especially as related to secular affairs; and, though its power over the multitude may still be felt in electoral campaigns, its influence in legislative bodies has largely passed away. See ORATORY; and, for the great orators of all ages:

GREEK:

Pericles
 Gorgias
 Isocrates
 Lysias
 Andocides
 Isæus
 Æschines
 Demosthenes
 Athanasius
 Chrysostom
 Basil the Great

ROMAN:

Cato of Utica
 Hortensius
 Cicero
 Ambrose

FRENCH :

Bossuet
 Bourdaloue
 Massillon
 Fénelon
 Mirabeau
 Barnave
 Vergniaud
 Guadet
 Danton
 Robespierre
 Royer-Collard
 Lamartine
 Lacordaire
 Thiers
 Gambetta
 Jaurès, J. L.

ITALIAN :

Mazzini

SPANISH :

Castelar

HUNGARIAN :

Kossuth

ENGLISH :

Taylor, Jeremy
 Baxter, Richard
 Whitefield
 Mansfield
 Burke
 Pitt, the Elder
 Pitt, the Younger
 Fox, C. J.
 Sheridan, R. B.
 Erskine, Lord
 Canning
 Bright, John
 Gladstone
 Drummond, Henry
 Spurgeon, C. H.

IRISH :

Curran
 Grattan

O'Connell

Emmet

AMERICAN :

Otis, James
 Henry, Patrick
 Lee, Richard Henry
 Ames, Fisher
 Channing, W. E.
 Randolph, John
 Wirt, William
 Benton
 Clay
 Webster
 Calhoun
 Hayne
 Everett
 Choate, Rufus
 Seward, W. H.
 Sumner, Charles
 Stephens, Alexander
 Beecher, H. W.
 Douglas, Stephen A.
 Evarts, W. M.
 Edmunds, George
 Conkling, Roscoe
 Ingersoll, Robert
 Brooks, Phillips
 Bryan, William Jennings
 Choate, Joseph H.

8. THE FABLE.

Probably it was the inhabitants of India who first ascribed human wisdom and language to animals. From India the fable passed westward, and, beginning with the Greek *Æsop*, we find practically the same scheme and contents in all European fabulists. See:

INDIA :

Pancatantra
 Bidpai

ARABIAN :

Lokman

GREEK :

Æsop

LATIN :

Phædrus

FRENCH :

Marot

La Fontaine

Perrault

Florian

Laboulaye

RUSSIAN :

Krylov

GERMAN :

Hagedorn

Gellert

Lessing

Grimm

NORWEGIAN :

Asbjørnsen

Moe

DANISH :

Andersen

ENGLISH :

Gay

Amiel

Selden : Table Talk

Pepys

Evelyn

Walpole, Horace

Chesterfield

10. JOURNALISM.

The press, which must be regarded as an important element in the literary life of any nation, may be studied under the following heads :

Periodical Literature

Journalism, College

Newspaper

Punch

Figaro

Times, The

Printing

A partial list of noteworthy names in journalism is as follows :

About, Edmond

Blowitz, Henri Georges

Bonner, Robert

Bowles, Samuel

Creelman, James

Curtis, W. E.

Dana, C. A.

Forbes, Archibald

Godkin, E. L.

Greeley, Horace

Halstead, Murat

Harden, Maximilian

Kennan, George

Labouchère, Henry

Lemon, Mark

Norman, Henry

Northcliffe, Lord

Pulitzer, Joseph

Raymond, H. J.

Reid, Whitelaw

Rocheftort, Henri

Russell, W. H.

Sala, G. A. H.

9. PERSONAL LITERATURE.

This name may be applied to such productions as diaries, memoirs, letters, and "confessions" of distinguished men and women, or men and women whose experiences in life have been extraordinary. Written, it may be presumed, for the purpose of self-expression, they are valuable indexes of character, motives, and causes. See :

Letters in Literature

Aurelius, Marcus : Meditations

Augustine : Confessions

Sévigné, Marquise de

Saint-Simon : Mémoires

Rousseau : Confessions

Senancour : Obermann

Smalley, G. W.
Stanley, H. M.
Stead, W. T.
Steevens, G. W.
Taylor, Bayard
Traill, H. D.
Villiers, F.
Watterson, Henry
Weed, Thurlow
White, Horace
Wilkinson, H. S.
Young, J. R.

11. MISCELLANEOUS TITLES.

Manuscript
Manuscripts, Illumination of

Papyrus
Palimpsest
Paleography
Codex
Coster
Gutenberg
Fust
Elzevir
Manutius
Foulis
Encyclopædia
Dictionary
Larousse
Brockhaus
Copyright
Literary Property

Chapter 10. The Fine Arts

(Architecture)

THE study of the fine arts may be approached from one of three different points of view. The first of these is the historical, in which the student desires to obtain a comprehensive view of the art of a nation or of an entire period, its general characteristics and development. Another is the artistic, in which knowledge of a particular art or of some of its aspects is desired. A third is the biographical, in which the interest centres about an individual artist. To meet the first point of view, the *New International Encyclopædia* contains general articles treating the architecture, sculpture, painting, and minor arts of certain nations and periods. These general articles may best be divided into two groups: those treating the art of Oriental nations, whose artistic development is remotely or not at all concerned with the general European evolution; and those dealing with the great periods of artistic development participated in by the Occident in general. This division obviates the necessity for general articles on the art of separate European countries, as, for instance, French art, which will be found treated under ROMANESQUE, GOTHIC, and RENAISSANCE ART, and in the general articles ARCHITECTURE, SCULPTURE, PAINTING. The artist's point of view is represented by general articles on Painting, Sculpture, and Architecture, and by articles on the various schools, and on technical terms and processes. The biographical side is fully dealt with in the lives of all the principal artists. The art museums are usually described under the titles of the cities in which they are situated; but a few are of sufficient importance to require separate articles. The principal schools of design are described in the general article upon that subject and in special articles on the more important schools. The description of celebrated representations in painting and sculpture is usually given in the biography of the artist who produced them. The article MYTHOLOGY IN ART gives a general treatment of such representations in Classic Art, which are further treated under the names of the subjects represented, as JUPITER, HERCULES, ACHILLES. The article ICONOGRAPHY similarly treats Christian Art, and there are special articles on a number of important themes of artistic treatment, such as CHRIST IN ART and MADONNA.

A. General Articles

I. INTRODUCTORY:

Art
Art, Primitive
Æsthetics

Assyrian Art
Jewish Art
Phœnician Art
Mohammedan Art
Persian Art
Indian Art
Chinese Art
Japanese Art

II. ORIENTAL ART:

Egyptian Art
Babylonian Art

III. EUROPEAN DEVELOPMENT:

Greek Art
 Etruria
 Roman Art
 Christian Art
 Byzantine Art
 Monastic Art
 Romanesque Art
 Lombard Art
 Gothic Art
 Renaissance Art

IV. ART MUSEUMS, SOCIETIES, AND SCHOOLS:

Design, Schools of
 École des Beaux-Arts
 National Academy of Design
 Society of American Artists
 Royal Academy of Arts
 Saint Luke, Academy of
 British Museum
 Louvre
 Luxembourg Palace
 Pitti Palace
 Uffizi

B. Architecture

In its widest sense, Architecture includes any kind of construction; but, in the *New International Encyclopædia*, the term is usually restricted to building which attains the dignity of art. Purely technical and utilitarian phases of architecture are treated under BUILDING, FIREPROOF CONSTRUCTION, MASONRY, and similar titles. (See the chapter on Manufactures and Engineering.) The three principal varieties of architecture are civil, religious, and military; and under these heads will be found their chief subdivisions. A few of these call for more detailed treatment of the component parts, and these are best enumerated below in connection with that style under which they were principally developed; as, for instance, TEMPLE under Greek Architecture, CHURCH under Early Christian, MONASTERY and CASTLE under Romanesque. Most celebrated works of architecture are treated in the articles on those cities in which they are situated; but a number of buildings of especial interest are

treated separately, and in the following scheme of study, such buildings are enumerated under the different styles of architecture of which they are representative. For example, PARTHENON, ERECHTHEUM, etc., appear under Greek Architecture, NOTRE DAME DE PARIS and WESTMINSTER ABBEY under Gothic.

I. CIVIL ARCHITECTURE:

Municipal Architecture
 Forum
 Palace
 Fountain
 Villa
 Mausoleum
 Theatre
 Amphitheatre
 Circus
 Bath
 Town Hall
 Arch, Triumphal
 Aqueduct
 Bridge

II. RELIGIOUS ARCHITECTURE:

Temple

Church
Cathedral
Monastery
Oratory
Baptistery

III. MILITARY ARCHITECTURE:

Acropolis
Citadel
Castle
Camp
Fortification

IV. TECHNICAL TERMS.

A large number of architectural terms deserve special treatment. Some of these, which are general in their application, are enumerated below, while others, the application of which is restricted to a particular style, are enumerated under that style; as, for example, *Mosque* under *Mohammedan*. See:

Arabesque
Arcade
Arch
Balcony
Balustrade
Bay Window
Belfry
Ceiling
Colonnade
Column
Cupola
Dome
Door
Doorway
Façade
Floor
Hall
Molding
Orders of Architecture
Ornament
Panel

Pendentive
Pilaster
Pillar
Porch
Portal
Roof
Spire
Tower
Tracery
Window

V. HISTORIC STYLES AND BIOGRAPHY.

Architecture is the most ancient and, perhaps, the most important of the fine arts. In most artistic developments, both painting and sculpture have been subordinate to it. Its historical treatment, therefore, forms an extensive and important part of the general department of architecture in the *Encyclopædia*. A general historical sketch of its development, from the most ancient times to the present, is given in the article *ARCHITECTURE*. This should be supplemented by the copious articles on the great historic styles, with the biographical additions given in the following list. Our treatment will outline the salient features of the different styles, beginning with those Oriental nations whose architecture lies remote from the European development—such as China, India, and Japan. We then proceed to those ancient nations, like Babylonia and Egypt, which materially influenced the Greek architecture. From Greek architecture, is descended the Roman, and from the Roman, the Mediæval and Renaissance styles, and finally the architecture of the present day.

1. *India*.

The architecture of India begins with the Buddhist style (B. C. 300-A. D.

700), whose buildings are of three classes: stupa or tope (a mound enclosing a relic); rock temples (chaityas); and monasteries (viharas). The Neo-Brahmanic style (beginning A. D. 700) comprises many varieties, including the so-called Jaina and Dravidian. It developed the architectural detail, the over-rich ornamentation, the pagodas and gopuras of the South. The Mohammedan architecture of India, differing materially from these styles, is best treated under MOHAMMEDAN ART. See:

Indian Art
Tope
Vihāra
Ellora
Vijayanagara
Boro Buddor
Elephanta
Mohammedan Art

2. *China and Japan.*

The most characteristic feature of Chinese architecture, which begins in the first century B. C., after the advent of Buddhism, is the tiled roof of tent-like form. Others are the pagoda, the pail-loo (a monumental gateway), and elaborately colored surface decoration. Japanese architecture, which begins with the seventh century A. D., is even less massive. It makes more of timber construction, and spends more upon roof effects than the Chinese. See:

Chinese Art
Japanese Art
Pagoda

3. *Babylonia and Assyria.*

The earliest dated architectural remains are those of the Babylonians, from as far back as B. C. 6000. Their build-

ing material was brick, and they were the first to construct vaults and arches. Their most important buildings were the temples, which were stepped pyramids of great height, brilliantly colored with glazed tiles. Their city walls were of amazing height and thickness.

Assyrian architecture was derived from the Babylonian, but was more secular in character, the chief buildings being the royal palaces, in which it perfected decorative relief sculpture of a high order. See:

- (a) Babylonian Art
 - Babylon
 - Babel, Tower of
 - Nippur
 - Erech
 - Ur
- (b) Assyrian Art
 - Nineveh
 - Nimrud
 - Khorsabad
 - Koyunjik

4. *Persia, Phœnicia, Judea.*

The Babylonian-Assyrian influence was determinative for the architecture of the Hittites, and for the utilitarian art of the Phœnicians, who built for Solomon the Temple at Jerusalem. Ancient Persian architecture shows a mingling of Babylonian with Egyptian and Greek influences; but, under the Parthian and Sassanian dynasties, it reverted to purer Oriental types. See:

Hittites
Phœnician Art
Jewish Art
Temple at Jerusalem
Persian Art
Ecbatana
Susa

Pasargadæ
Firuzabad

5. Egypt.

The architectural monuments of the Old Empire (B. C. 4500-2160) are chiefly sepulchral—pyramids, mastabas, and tomb-temples. Temple architecture took on a new development with the Middle Empire (B. C. 2160-1788), and attained its highest development under the New Empire (B. C. 1588-1150), which followed the disastrous interruption of the Hyksos invasion. After a long decline, there was a brilliant revival under the Ptolemies in the third century B. C. The temples were often, like the Ramesseum, sepulchral; some were rock-cut, as at Abu-Simbel; some partly hewn and partly constructed, as at Deir-el-Bahri. The greatest temples are those of Karnak, Luxor, Medinet-Habu, Abydos, the Ramesseum, and the Ptolemæ and Roman temples of Denderah, Philæ, and Edfu. For descriptions, consult the section *Architecture*, under EGYPTIAN ART. See:

Egyptian Art
Pyramid
Mastaba
Mêdûm
Luxor
Thebes
Karnak
Edfu
Elephantine
Abu-Simbel
Deir-el-Bahri
Ramesseum
Medînet Habu
Denderah
Philæ
Beni-Hassan

6. Greece.

The Mycenæan architecture in Greek lands, sometimes known as the Ægean style, is described under ARCHÆOLOGY, and in the articles on the principal sites of this culture. From the main hall of the Mycenæan palace was evolved that marvelous structural masterpiece, the Greek Temple, the final type of which appears in the seventh century B. C. For a description of this temple, which is the central figure of Greek architecture, consult GREEK ART. The origin and development of the two principal styles of temple architecture, Doric and Ionic, are treated under ARCHITECTURE and ARCHÆOLOGY. The earliest examples of the Doric are in Sicily and Southern Italy, and it attained perfection during the fifth century, in buildings like the Parthenon and Theseum at Athens, and in the temples of Pæstum. The Ionic order was increasingly used in the fourth century B. C., as at Miletus and Ephesus, the Corinthian being as yet used for small monuments only. The Hellenistic age saw a great development of architecture of a private, civil, and sepulchral character, like the stoa, propylæa, theatre, odeon, and mausoleum.

(a) General Titles:

Cyclopean Architecture
Archæology
Greek Art
Temple
Doric Order
Ionic Order
Corinthian Order
Column
Fluting
Entablature
Base

Pediment
 Frieze
 Cornice
 Acanthus
 Pæstum
 Agrigentum
 Selinus
 Segesta
 Parthenon
 Theseum
 Erectheum
 Phigalia
 Miletus
 Diana, Temple of
 Teos
 Magnesia

(b) Civil Architecture:

Propylæa
 Stoa
 Colonnade
 Stadium
 Theatre
 Mausoleum
 Choragic Monument

(c) Biography:

Ictinus
 Callicrates
 Mnesicles

7. *Rome.*

For a general view of Roman architecture, the student is referred to **ROMAN ART**. The early architecture of Rome is practically Etruscan, and to this people the Romans owe their knowledge of vaulting and the arch. At the close of the republican epoch, they adopted Greek orders, evincing special preference for the Corinthian, which they developed into an independent order, and from which they evolved the so-called composite. These forms were decoratively used as adjuncts of con-

struction. The principal works of Roman architecture were great civil structures, like the fora, triumphal arches, amphitheatres, thermæ, aqueducts, besides many superb temples. The highest development was during the first 150 years of the empire, after which came the decline. See:

(a) Etruria (section on Art)

Cloaca
 Roman Art
 Aqueduct
 Tabularium
 Forum
 Trajan, Forum of
 Basilica
 Pantheon
 Theatre
 Amphitheatre
 Arch, Triumphal
 Trajan, Arch of
 Titus, Arch of
 Constantine, Arch of
 Septimius Severus, Arch of
 Antonine Column
 Caracalla, Baths of
 Diocletian, Baths of
 Tivoli
 Pompeii
 Herculaneum
 Baalbek
 Palmyra

(b) Biography:

Apollodorus

8. *Early Christian.*

Early Christian architecture is an adaptation of the declining Roman to the needs of Christian worship. The requirement was a large interior for many worshipers, resulting in the development of the basilical construction, which became typical for church build-

ing. The component parts of the basilica are discussed in the articles listed below under **Basilical Construction**. The article **CHURCH** gives the general development of the church building. To this is added a list of other terms of ecclesiastical architecture.

(a) **Basilical Construction:**

Basilica
Apse
Transept
Atrium
Nave
Altar
Choir
Confessional

(b) **Church, etc.:**

Church
Catacombs
Chancel
Chapel
Crypt
Font
Reredos
Sacristy

9. *Byzantine.*

In the eastern half of the Roman Empire, the Byzantines developed the domical construction, inventing the pendentives to support the dome. Byzantine architecture was also characterized by rich mosaic decoration. Its great masterpieces are the Church of Saint Sophia at Constantinople and Saint Mark's at Venice. It prevailed throughout the Eastern Empire until its destruction by the Turks; in Southern Italy, Sicily, Venice, and Ravenna; in Armenia, the Balkans, and wherever else the Greek Church prevailed. Russian architecture is a development of the Byzantine. See:

Byzantine Art

Mosaic

Dome

Pendentive

Saint Sophia

Saint Mark's Church

Anthemius (of Tralles)

10. *Mohammedan.*

Coincident with the Mohammedan conquests, a style of architecture arose based upon the Byzantine and Persian. Its golden age began with the tenth century, and the final types were attained in the eleventh. The ultimate type of the mosque was built on the court-plan, with pointed arches, highly colored geometrical ornament, and dome vaulting. The principal schools were the Moorish (Spain), Egyptian, Turkish, Persian, and the Mohammedan styles that grew up in India. All these are described in **MOHAMMEDAN ART**, besides which there are articles upon the most prominent features of Mohammedan architecture. See:

Mohammedan Art

Mosque

Minaret

Tekiyé

Bazar

Caravanserai

Alhambra

Taj Mahal

11. *Romanesque (A. D. 800-1200).*

In Middle and Western Europe, Early Christian architecture was succeeded by the Romanesque, which was pre-eminently the art of the monastic orders and of feudalism. Among its innovations were the cruciform plan, the developed crypt, and the incorporation of bell-towers with the church building. But the principal achieve-

ment of Romanesque architecture was the perfection of vaulting,—the dome and tunnel vault in Southern France, and the groined vault in Lombardy, the Rhinelands, Normandy, and England. It thus led the way to the development of the pointed arch and Gothic architecture. The basis of the study of Romanesque architecture should be the appropriate section of ROMANESQUE ART. See:

Romanesque Art
Lombard Art
Norman Architecture
Vault
Crypt
Bell-Tower
Castle
Keep
Bailey
Tower
Bastion
Barbican
Wartburg
Monastery
Cloister
Chapter-house
Dormitory

12. *Gothic.*

Gothic architecture is the development of Romanesque groined vaulting. By means of the pointed arch, the most characteristic feature of the system, the vertical strains are concentrated in powerful piers, the horizontal thrusts on flying buttresses, permitting light walls, huge windows and an infinite wealth of statuary and tracery. Gothic architecture originated in France in the twelfth century, and there it also attained its most perfect development in the thirteenth, declining into the Flamboyant style of the fifteenth century.

Spanish Gothic of the thirteenth century is second only to the French, though later debased by too much ornament. In England, a peculiarly national style arose, which should be studied under the headings by which three varieties are usually known, EARLY ENGLISH, DECORATED, and PERPENDICULAR. At its best, the German Gothic is noted for its beautiful tracery and spires. In Italy, the Gothic style is purely decorative, and it produced a charming style of civic buildings, especially in Tuscany and Venice. The basis of study should be the article, GOTHIC ARCHITECTURE, supplemented by the articles on special churches, and the descriptions in the articles on the cities, a few of which are appended. See:

(a) Gothic Architecture

Vault
Flamboyant
Early English
Decorated Style
Perpendicular
Fan-Tracery Vaulting
Notre Dame de Paris
Sainte Chapelle
Westminster Abbey
Santa Croce

(b) Cathedral Cities:

Rheims
Amiens
Burgos
Lincoln
Salisbury
York
Canterbury
Winchester
Cologne
Strassburg
Nuremberg

Freiburg
Milan
Florence
Siena
Orvieto

(c) Biography:

Montreuil, Pierre de
William of Wykeham
Erwin
Arnolfo di Cambio

13. *Renaissance.*

(a) Italy.

Renaissance architecture is the adaptation of classical forms, as they survived in Roman remains, to the architectural needs of the day. The Early Renaissance (fifteenth century) originated in the works of Brunelleschi at Florence, whence it was introduced into the rest of Italy. Its work was decorative in character, the constructive side being rather developed by the Roman school, headed by Bramante. The tendency was increasingly towards the formal classicism evinced in the works of Palladio and Vignola. As a reaction, came the freer but exaggerated Barocco of the seventeenth and eighteenth centuries. The basis of study should be the section *Architecture*, under RENAISSANCE ART.

(i) Prominent Buildings:

Certosa
Doge's Palace
Pitti Palace
Lante, Villa
Villa, Giulia
Saint Peter's Church

(ii) Biography:

Brunelleschi, Filippo
Michelozzi, Michelozzo

Alberti, Leone Battista
Giuliano da Majano
Laurana, Luciano da
Sangallo
Bramante, Donato d'Agnolo
Peruzzi, Baldassare
Sansovino, Jacopo
Michelangelo
Vignola, Giacomo Barozzo da
Palladio, Andrea
Serlio, Sebastiano
Scamozzi, Vincenzo
Fontana, Domenico
Maderna, Carlo
Bernini, Giovanni Lorenzo
Borromini, Francesco
Ammanati, Bartolommeo
Longhena, Baldassare

(b) Other Countries.

Outside of Italy, the most important development of Renaissance architecture was the French. Its most original type was the mediæval castle transformed into the palace of the Renaissance. There was constant influence from Italy, but the later French Barocco is superior to the Italian. In Germany, the Gothic elements survived late, and materially influenced the incoming Renaissance. A similar development occurred in other European countries. Spain made use of much elaborate decorative detail. The Renaissance appeared latest of all in England in the seventeenth century. A kind of Palladian High Renaissance, adopted by Inigo Jones, and developed by Wren, retained a purifying influence during the eighteenth century, until the advent of classic revival.

(i) France:

Palace
Chambiges, Martin

Bullant, Jean
 De l'Orme, Philibert
 Lescot, Pierre
 Brosse, Salomon de
 Mansart
 Fontainebleau
 Louvre
 Tuileries
 Luxembourg Palace

(ii) Great Britain:

Jones, Inigo
 Wren, Sir Christopher
 Van Brugh, Sir John
 Hawksmoor, Nicholas
 Chambers, Sir William
 Nash, Sir John
 Dance, George
 Saint Paul's Cathedral
 Whitehall

14. *Nineteenth Century.*

The reaction against the exaggerated styles of the eighteenth century was an imitation of classical forms. In France, Roman forms were predominant in the great structures of the Republic and first Empire; but, in England and Germany, Greek forms were more closely followed. About 1830 came the Gothic revival, which attained especial development in England, in such buildings as the Houses of Parliament and numberless churches. The present tendency is towards Renaissance forms and greater freedom from tradition.

The tasteful colonial architecture of the United States followed English models, but the early republic adopted the classic revival (Capitol). The period of the Civil War (till 1870) was singularly unfruitful; but between 1870 and 1880 there was a revival of the artistic spirit. The problem of

the artistic treatment of the skyscraper with the steel-frame construction is as yet unsolved; but constant improvement is being made. The basis of study should be the section on the *Nineteenth Century*.

(a) France:

Soufflot, Jacques Germain
 Percier, Charles
 Fontaine, P. F. L.
 Viollet-le-Duc
 Visconti, L. T. J.
 Garnier, J. L. C.

(b) Germany and Austria:

Gärtner, Friedrich von
 Schinkel, Karl Friedrich
 Klenze, Leo von
 Hansen, Theophilus von
 Semper, Gottfried

(c) Great Britain:

Soane, Sir John
 Smirke, Sir Robert
 Pugin, Augustus
 Pugin, Augustus N. M.
 Wyatt, Sir Matthew D.
 Fergusson, James
 Scott, Sir George Gilbert
 Street, George Edmund
 Barry, Sir Charles
 Waterhouse, Alfred
 Paxton, Sir Joseph
 Parliament, Houses of

(d) United States:

Latrobe, Benjamin Henry
 Bulfinch, Charles
 Walter, Thomas Ustick
 Renwick, James
 Upjohn, Richard
 Hunt, Richard Morris
 Richardson, H. H.
 McKim, Charles F.

Chapter 11. The Fine Arts

(Sculpture and Painting)

(Read general introduction at the opening of preceding chapter.)

A. Sculpture

The study of sculpture centres about the general article on that subject. In this article will be found sections on the technical processes and materials, especially the modern, and on the different forms of sculpture, and a sketch of the history of sculpture, containing a description of the characteristics and the development of the different schools, as revealed in their principal artists. The study of the technical forms and processes of sculpture should be supplemented by the special articles enumerated below, which also contain historical sketches of these subjects; that of the history by those on the different schools and epochs of art, and above all by the biographies of the artists, some of which are enumerated below.

I. BRANCHES AND TECHNIQUE OF SCULPTURE.

- Carving
- Chasing
- Founding
- Relief Sculpture
- Equestrian Statue
- Bronze
- Chryselephantine
- Goldsmith's Work
- Terra Cotta
- Ivory
- Metal Work
- Wood-carving
- Stucco

II. GREEK AND ROMAN SCULPTURE.

The sculpture of Oriental countries

is decorative in character, and therefore best considered in connection with their architecture, under the titles of the division Oriental Art, enumerated in Chapter 9, Section A. Among the Greeks, sculpture first attained the dignity of an independent art, and achieved the highest ideal perfection in the world's history. The study of the separate epochs of Greek sculpture should be based upon the articles ARCHÆOLOGY and GREEK ART. Its rude beginnings date from the seventh century B. C., and by the end of the archaic period (B. C. 480) the emancipation was well advanced. The Attic period (480-323), during which the chief art centre was at Athens, witnessed the highest development of Greek art. It is ushered in by a period of transition (till about 450), in which great progress was made towards mastery of technique. The last half of the fifth century, the age of Phidias, begins the golden period of Greek art. The greatest technical knowledge was subordinated to idealism and self-restraint, and to the utmost nobility of conception. The golden age continued during the epoch of Praxiteles and Scopas, which, though still ideal, was more realistic and interested in individual traits and features. It succeeded especially well in portraiture, and attained the highest mastery of technique. During the Hellenistic age (323-146), the centres of art passed from Greece to Asia and Egypt, to

Pergamus, Rhodes, and Alexandria. Art came more into the service of individuals, and, notwithstanding the highest technical skill, it often sought sensational or trivial subjects. Roman sculpture is, for the most part, copied from the Greek, and shows little originality except in a fine realistic rendition of portraiture, and in pictorial relief-sculpture. See:

1. *The Archaic Period:*

Archæology
Greek Art
Antenor

2. *The Attic Period:*

Æginetan Sculptures
Calamis
Pythagoras of Rhegium
Myron
Discobolus
Phidias
Elgin Marbles
Polyclitus
Agoracritus
Cresilas
Pæonius
Cephisodotus
Praxiteles
Demétrius
Scopas
Mausoleum
Marsyas

3. *The Hellenistic Period:*

Lysippus
Pergamon
Zeus Atricoli
Apollo Belvidere
Venus of Milo
Laocoön

4. *The Roman Sculpture:*

Section *Sculpture* under Roman
Art
Venus of Medici

III. MEDIEVAL SCULPTURE.

The decorative sculpture of the Middle Ages can best be studied in connection with the architecture of the period, under the titles of the mediæval epochs enumerated in Chapter 9, Section A. The history of modern sculpture begins with the Italian revival of the thirteenth century. Nicola Pisano found his models in the antique, but his son Giovanni reverted to the Gothic, and his naturalistic, dramatic style prevailed in Italy. The Pisan School was the mother of those of Florence and Siena. The former was superior in technique and composition, the latter was rather picturesque and narrative in character. During the entire Middle Ages, and to some extent during the Renaissance, the usages of Church worship furnished abundant opportunity for the sculptor's art. See:

1. *First Revival in Italy* (under Sculpture)

Christian Art
Byzantine Art
Romanesque Art
Gothic Art
Antelami, Benedetto
Pisano, Nicola
Pisano, Giovanni
Pisano, Andrea
Arnolfo di Cambio
Andrea di Ugolino
Orcagna, Andrea

2. *Ecclesiastical Sculpture:*

Altar
Pulpit
Ambo
Cross
Crucifix
Reliquary

Chalice
Tomb

IV. THE RENAISSANCE.

The sources of inspiration during the Renaissance were the study of nature and of the antique, as it survived in ancient statues. The chief characteristic of the Early Renaissance is a healthy naturalism. It attained a high perfection, in relief as in statuary, and excelled equally in bronze, marble, and terra cotta. The centre of the art was Florence, and the dominant figure during the fifteenth century, amid a brilliant array of artists, was Donatello. The school of Siena was more sentimental in feeling and elaborate in decoration; those of Lombardy and Venice were luxuriant in decoration, the former being more vigorous in form. The High Renaissance is characterized by a deeper knowledge and greater influence of the antique and by a more universal style, notably in works of its greatest master, Michelangelo; but these qualities afterward degenerated into a mannered imitation, and later into the extravagances of the Baroque.

The sculpture of France in the fifteenth century was at first influenced by that of Flanders, but the native style soon became transformed by Italian grace and beauty. Even the Baroque of the seventeenth century here exhibits a certain classical restraint. During the eighteenth exaggerated form gave place to the more delicate and decorative treatment of the Rococo, which excelled especially in statuettes. A fine, healthy realism ultimately prevailed. In Germany, Gothic forms lingered throughout the

fifteenth century, and when, during the sixteenth, the Italian influence arrived, it was less important than in other countries and confined to the South. A native naturalistic art dominated the Netherlands during the fifteenth century, but, in the seventeenth, the Italian Baroque entered, and, in the eighteenth, sculpture declined. A similar development occurred in Spain, where wood sculpture found great employment in altars, retables, reredoses. Its apogee was a realistic reaction in the seventeenth century, with centre at Seville. See Section *The Renaissance*, under SCULPTURE.

1. *Italy:*

(a) Florence:

Ghiberti, Lorenzo
Donatello
Michelozzi
Robbia, Luca della
Verrocchio, Andrea del
Pollaiuolo, Antonio
Desiderio da Settignano
Rossellini
Benedetto da Maiano
Mino da Fiesole
Civitate, Matteo
Sansovino, Andrea
Michelangelo
Cellini, Benvenuto
Boulogne, Jean

(b) Other Cities:

Quercia, Jacopo della
Mazzoni, Guido
Solari, Cristoforo
Lombardi, Pietro
Leopardi, Alessandro
Sansovino, Jacopo
Leoni, Leone
Bernini, Giovanni Lorenzo
Algardi, Alessandro

2. *France:*

Colombe, Michel
 Goujon, Jean
 Pilon, Germain
 Puget, Pierre
 Coyzevox, Antoine
 Girardon, François
 Pajou, Augustin
 Pigalle, Jean Baptiste
 Falconnet, Etienne
 Michel, Claude (Clodion)
 Houdon, Jean Antoine

3. *Germany:*

Wohlgemuth, Michel
 Stoss, Veit
 Krafft, Adam
 Vischer, Peter
 Riemenschneider, Tilman
 Syrlin, Jörz
 Schlüter, Andreas
 Donner, Raphael

4. *Other European Countries:*

Sluter, Claus
 Duquesnoy, François
 Quellinus, Artus
 Berruguete, Alfonso
 Montañes, Martinez
 Cano, Alonzo
 Gibbons, Grinling

V. MODERN SCULPTURE.

The reaction upon the extravagances of Baroque sculpture, at the close of the eighteenth century, took the form of a return to classic simplicity, and the antique was imitated more closely than ever before. In France, this classicism was followed by a Romantic tendency, corresponding to a similar movement in painting, and by a more important naturalistic reaction. In the second half of the nineteenth

century, classicism and naturalism ran parallel, with an increasing influence of the latter, which now prevails. England had a similar classical period, and a subsequent transition to naturalism; but since 1870 a great change, both in conception and treatment, has come over English sculpture chiefly through the effort of great English painters and the French influence. The German reaction against classicism resulted in the historical school of Berlin, whose work tended toward naturalism, and in the romantic school of Munich; not until the end of the nineteenth century did naturalism prevail. In other European countries the development has been similar to that general evolution described above. After some ineffectual early attempts, America also had its classical school, with a number of important artists. Since the last quarter of the nineteenth century the tendency has been entirely naturalistic, and an array of talent has appeared which compares favorably with that of other countries. See:

1. *France:*

Pradier, James
 David d'Angers
 Rude, François
 Barye, Antoine Louis
 Chapu, Henri Michel
 Dubois, Paul
 Mercié, Antonin
 Barrias, Ernest
 Bartholdi, Frédéric
 Carpeaux, Jean Baptiste
 Frémiet, Emmanuel
 Dalou, Jules
 Rodin, Auguste
 Bartholomé, Paul Albert

2. *England:*

Flaxman, John
Westmacott, Richard
Gibson, John
Stevens, Alfred
Foley, John Henry
Woolner, Thomas
Watts, George Frederick
Thornycroft, Hamo
Brock, Sir Thomas
Ford, Edward Onslow
Gilbert, Alfred
Frampton, Sir George
Epstein, Jacob

3. *Germany:*

Dannecker, Johann Heinrich
Schadow, Johann Gottfried
Rauch, Christian
Hähnel, Ernst
Rietschel, Ernst
Schilling, Johannes
Schwanthaler, Ludwig
Begas, Reinhold
Stuck, Franz
Klinger, Max
Zumbusch, Kaspar
Tilgner, Viktor
Strasser, Arthur
Tuaillon, Louis

4. *Other European Countries:*

Canova, Antonio
Thorvaldsen, Bertel
Tenerani, Pietro
Marchesi, Pompeo
Dupré, Giovanni
Ximenes, Ettore
Sergel, Johan Tobias
Sinding, Stefan
Antokolski, Mark
Troubetzkoi, Prince Paul

5. *United States:*(a) *Classicists:*

Greenough, Horatio
Powers, Hiram
Crawford, Thomas
Story, William Wetmore
Rogers, Randolph
Rogers, John
Rinehart, William Henry
Hosmer, Harriet

(b) *Early Naturalists:*

Palmer, Erastus Dow
Mills, Clark
Ball, Thomas
Brown, Henry Kirke
Ward, J. Q. A.
Keyser, Ephraim

(c) *Naturalism Under French Influence:*

Warner, Olin Levi
Saint Gaudens, Augustus
French, Daniel Chester
Macmonnies, Frederick
Bitter, Karl
Niehaus, Charles Henry
Partridge, William Ordway
Dallin, Cyrus Edwin
Proctor, A. Phimister
Kemeys, Edward
Bartlett, Paul
Barnard, George Grey
Borglum, Gutzon
Borglum, Solon H.
Platt, Bela Lyon
Grafty, Charles
Calder, Alexander S.
Taft, Lorado
Tilden, Douglas
Aitkin, Robert I.
Vonnoh, Bessie Potter

B. Painting

A series of special articles treats the technical side of painting, the different varieties, the painter's implements, and the qualities by which a picture should be judged. The history of the different schools is comprehensively described under PAINTING. This article should form the basis of the study of any given school; it should, however, be supplemented by the articles on separate schools and the biographies of the artists, of which only the principal are contained in the following lists.

I. TECHNIQUE AND ALLIED ARTS.

1. *Varieties:*

- Mural Decoration
- Genre Painting
- Portraiture
- Landscape
- Still Life

2. *Technical Processes:*

- Fresco
- Tempera
- Oil Painting
- Pastel
- Water-Color Painting
- Encaustic Painting
- Stereochromy

3. *Implements:*

- Canvas
- Easel
- Mahlstick
- Ground
- Painters' Colors

4. *Technical Qualities:*

- Drawing
- Line
- Perspective
- Chiaroscuro

- Color
- Composition
- Proportion

5. *Analogous Arts:*

- Mosaic
- Stained Glass
- Decorative Art
- Sgraffito

II. GREEK PAINTING.

The decorative painting of Oriental countries is treated under the different titles of the subdivision Oriental Art, in the introductory section of the preceding chapter. Greek painting was the first to rise to the dignity of an independent art. The transition from the painting of Cretan and Mycenæan decorations, which show considerable technical skill and a high power of invention, to that of the fifth century B. C. can be studied only in vase-painting (see VASE). In the fifth and fourth centuries B. C., Greek painting attained its highest development. The older Attic School, with Polygnotus as its founder and Athens as a centre, brought the art to a high state of development in the years following the Persian wars. Its decorative work was practically great, colored, outline drawings, noble in composition and expression. Perspective and shading were discovered by Agatharchus of Samos, a scene painter, and applied to panel-painting by Apollodorus of Athens. In the later fifth century flourished the Ionian School of Zeuxis and Parrhasius, which substituted realism for the old idealism and excelled in delicate drawing and chiaroscuro.

In the early fourth century, the centre of painting shifted to Sicily, where systematic drawing and chiaroscuro were further developed, and the process of encaustic painting was invented. The Theban-Attic School (second half of the fourth century) was devoted to impassioned subjects, like battle pieces, and even to genre, and the highest technical perfection was achieved by the younger Ionian School in the persons of Apelles and Protogenes. In the Hellenistic age painting increased the range of its expression, including even the landscape, but it declined in artistic quality. The decorative and less important painting of the Roman epoch is treated under ROMAN ART. See:

1. *General References:*

Section *Painting* under Greek
Art and Roman Art
Vase

2. *Greek Painters:*

Polygnotus
Micon
Agatharchus
Apollodorus
Zeuxis
Parrhasius
Pamphilus
Pausias
Apelles
Protogenes
Aldobrandini Marriage

III. MEDIEVAL PERIOD.

The origins of Mediæval painting were conditioned by the Mosaic style, as it prevailed in Early Christian and Byzantine art. Its growth was dependent upon the development of architecture in Church worship, and it con-

sequently remained decorative. At the close of the Gothic period, the emancipation of painting began in Italy, and individual artists arose. The chief centres were Florence, where Giotto founded a powerful school of mural painting, and Siena, which developed panel painting under strong Byzantine influence. See:

Mosaic
Christian Art
Byzantine Art
Romanesque Art
Gothic Art
Florentine School of Painting
Sienese School of Painting
Cavallini, Pietro
Cimabue
Giotto
Gaddi, Taddeo
Orcagna, Andrea
Aretino, Spinello
Duccio di Boninsegna
Martini, Simone
Lorenzetti
Gentile da Fabriano
Lorenzo, Don

IV. THE RENAISSANCE.

Naturalism dominated the painting of the Early Renaissance in Italy, the classic influence appearing only in the decorative motifs. Our study begins with Florence, where the great technical problems were solved for future painting. The High Renaissance combined the achievements of the Early with a profounder knowledge of the Antique. The Florentine school ranked highest in everything but color, in which the Venetians excelled, as did the Umbrians in religious sentiment. In Northern Europe the Renaissance, entirely naturalistic in character, but

Gothic in sentiment, first appeared in Flanders, whence its influence extended to Holland and Germany. Later the Italian influence transformed for the worse the art of the Netherlands, but aided to produce a national school in Germany. See:

1. *Italy.*

(a) General Titles:

Renaissance Art

Section *The Renaissance* under Painting

Florentine School of Painting

Umbrian School of Painting

Bolognese School of Painting

Ferrarese School of Painting

Venetian School of Painting

(b) Biography:

(i) Florence:

Masolino da Panicale

Angelico, Fra

Masaccio

Uccello, Paolo

Castagno, Andrea del

Lippi, Filippo and Filippino

Botticelli, Sandro

Gozzoli, Benozzo

Pollaiuolo, Antonio

Verrocchio, Andrea

Ghirlandaio, Domenico

Vinci, Leonardo da

Michelangelo

Bartolommeo, Fra

Sarto, Andrea del

Bronzino, Agnolo

(ii) Umbria:

Francesca, Piero della

Melozzo da Forlì

Santi, Giovanni

Signorelli, Luca

Perugino, Pietro

Pinturicchio

Raphael

(iii) Northern Italy:

Squarcione, Francesco

Mantegna, Andrea

Tura, Cosimo

Costa, Lorenzo

Francia, Francesco

Viti, Timoteo

Dosso Dossi

Garofalo

Correggio

Sodoma

Pisanello

Foppa, Vincenzo

Borgognone

Predis, Ambrogio da

Solario, Andrea

Luini, Bernardino

Ferrari, Gaudenzio

(iv) Venice:

Vivarini

Crivelli, Carlo

Antonello da Messina

Bellini (family)

Carpaccio, Vittore

Giorgione

Titian

Bonifazio Veronese

Lotto, Lorenzo

Tintoretto

Veronese, Paolo

Bassano

Moretto da Brescia

Moroni, Giambattista

(v) Rome:

Sebastiano del Piombo

Volterra, Daniele da

Pippi, Giulio (called Romano)

2. *The Netherlands:*

Netherlands Schools of Painting

Eyck, Huybrecht and Jan van

Weyden, Rogier van der

Bouts, Dierick

Hugo van der Goes
 Memling, Hans
 David, Gerard
 Matsys, Quinten
 Orley, Bernaert van
 Mabuse, Jan
 Lucas van Leyden
 Bosch, Hieronymus

3. *Germany:*

Lochner, Stephan
 Schongauer, Martin
 Wohlgemuth, Michel
 Dürer, Albrecht
 Burckmair, Hans
 Cranach, Lucas
 Holbein the Elder
 Holbein the Younger
 Grünewald, Matthias
 Baldung, Hans

4. *France and Spain:*

Fouquet, Jehan
 Clouet
 Cousin, Jean
 Coello, Alonzo
 Morales
 Theotocopuli (called El Greco)

V. SEVENTEENTH AND EIGHTEENTH CENTURIES.

The seventeenth century saw the rise of the Eclectic and Naturalist schools in Italy, and of a courtly art, based upon the classic, in France, whose artists in Italy also perfected the classic landscape. It was the golden age of painting in Spain, Flanders and Holland. Spain developed a great religious art, combining Catholic devotion with a trenchant realism, and a marvelous portraitist in Velazquez. The Flemish School was also realistic, but more influenced by Italy, and less religious in character. In Holland, a

highly developed national realism, practically uninfluenced from without, found expression in panels of portrait, genre, landscape, animal, and still life. The eighteenth century witnessed in France the light, graceful and decorative painting of the Rococo, and the rise in England of a bourgeoisie art, showing a curious admixture of Eclectic Italian influence with realism, and foreshadowing that of the nineteenth century. See Section *Seventeenth and Eighteenth Centuries* in the article on PAINTING.

1. *Italy:*

Bolognese School of Painting
 Carracci
 Domenichino
 Reni, Guido
 Guercino
 Dolci, Carlo
 Caravaggio
 Rosa, Salvator
 Giordano, Luca
 Tiepolo
 Canaletto
 Guardi, Francesco
 Carriera, Rosalba

2. *France:*

Poussin, Nicolas
 Gelée, Claude (Claude Lorrain)
 Lebrun, Charles
 Mignard, Pierre
 Champagne, Philippe de
 Watteau, Antoine
 Fragonard, Jean Honoré
 Chardin, Jean Siméon
 Lancret, Nicolas
 Boucher, François
 La Tour, Maurice
 Quentin
 Greuze, Jean Baptiste
 Vigée-Lebrun

3. *Spain:*

Herrera the Elder
 Ribera, Jusepe
 Velazquez
 Zurbaran
 Cano, Alonzo
 Coello, Claudio
 Murillo
 Goya y Lucientes

4. *Flanders:*

Rubens, Peter Paul
 Van Dyck, Anthonis
 Jordaens, Jacob
 Snyder, Frans
 Fyt, Jan
 Teniers the Younger
 Brouwer, Adriaen

5. *Holland:*(a) *Portraiture (q. v.):*

Mierevelt, Michiel
 Hals, Frans
 Rembrandt
 Maes, Nicolas
 Helst, Bartholomeus van der

(b) *Genre (q. v.):*

Ostade, Adriaen van
 Dou, Gerard
 Steen, Jan
 Terborch, Gerard
 Metzu, Gabriael
 Hooch, Pieter de
 Vermeer van Delft

(c) *Landscape (q. v.), etc.:*

Goyen, Jan van
 Ruysdael, Salomon
 Neer, Aert van der
 Ruisdael, Jacob
 Hobbema, Meindert
 Potter, Paulus
 Velde, Adriaen van de
 Cuyp, Albert
 Backhuysen, Ludolf

Velde, Willem van de, the
 Younger

Heem, Jan de
 Huysum, Jan van
 Beyeren, Abraham van
 David, Gerard
 Weenix, Jan
 Hondecoeter, Melchior

6. *England:*

Lely, Sir Peter
 Kneller, Sir Godfrey
 Hogarth, William
 Reynolds, Joshua
 Gainsborough, Thomas
 Romney, George
 Wilson, Richard
 Morland, George

VI. MODERN PAINTING.

1. *France.*

During the nineteenth century the hegemony of Europe in the fine arts belonged to France. Rococo art was succeeded in the last part of the eighteenth century by Classicism, which found the chief beauty of painting in form, as revealed in ancient sculpture. The reaction upon Classicism was Romanticism (from c. 1830), which used painting as an expression of the artist's emotional nature, and placed the chief emphasis upon color and natural truth. The Barbizon School represents the emotional impulse of Romanticism, as applied to landscape, animal painting, and peasant subjects. The third great factor in French painting is Realism, advocating the abolition of academic law and sentiment, and the exact presentation of natural truth. Then came Impressionism (1874), so called from a tendency to render momentary impressions, but which sought,

above all, to paint evanescent effects of light. Post Impressionism is a reaction on both Impressionism and Realism, which endeavors to paint pure feeling in purely abstract form and color. See:

(a) Classicists:

David, Jacques Louis
Prudhon, Pierre
Gros, Antoine Jean
Ingres, Jean Auguste Dominique

(b) Romanticists:

Géricault, Jean Louis
Delacroix, Eugène
Décamps, Alexandre Gabriel
Fromentin, Eugène
Vernet, Horace
Couture, Thomas
Regnault, Henri

(c) Eclectics:

Delaroche, Paul
Bouguereau, Guillaume Adolphe
Scheffer, Ary

(d) Barbizon Painters:

Corot, Camille
Rousseau, Théodore
Dupré, Jules
Díaz de la Peña
Daubigny, Charles François
Millet, Jean François
Troyon, Constant
Jacques, Charles
Cazin, Jean Charles

(e) Realists:

Courbet, Gustave
Bonnat, Léon
Duran, Carolus
Fantin-Latour
Meissonier, Ernest
Neuville, Alphonse Marie de
Détaille, Edouard

(f) Impressionists, etc.:

Impressionist Painting
Manet, Edouard
Renoir, August
Degas, Hilaire Germain
Raffaelli, Jean François
Monet, Claude
Pissaro, Camille
Sisley, Alfred
Besnard, Paul Albert

(g) Post Impressionists:

Post Impressionism
Cézanne, Paul
Gauguin, Paul
Matisse, Henri
Picasso, Pablo
Picabia, Francis

(h) Various Tendencies:

Flandrin, Jean Hippolyte
Puvis de Chavannes
Moreau, Gustave
Gérôme, Jean Léon
Vollon, Antoine
Bonheur, Rosa
Bastien-Lepage
Dagnan-Bouveret
Lhermitte, Léon

2. *Germany (including Austria).*

In Germany the reaction against Classicism first took the form of an imitation of Italian masters of the fifteenth century (Nazarenes). Extensive demand for mural decoration at Munich produced the so-called cartoon (q. v.) style, in which color was neglected. The Düsseldorf School represented the romantic tendencies of German art, chiefly in panel-painting. About 1850 a great change was effected by French and Belgian colorists; since 1870 Realism and since 1880 Impressionism have found entrance. The

most recent tendencies have been very radical (see **SECESSION**) and decorative in character, especially in Vienna. See:

Pre-Raphaelites

Düsseldorf School of Painting

Mengs, Raphael

Kauffmann, Angelica

Overbeck, Johann Friedrich

Cornelius, Peter von

Kaulbach, Wilhelm von

Rethel, Alfred

Schwind, Moritz von

Feuerbach, Anselm

Makart, Hans

Max, Gabriel

Munkácsy, Michael

Knaus, Ludwig

Defregger, Franz von

Grützner, Eduard

Menzel, Adolf

Lenbach, Franz

Leibl, Wilhelm

Böcklin, Arnold

Liebermann, Max

Klinger, Max

Thoma, Hans

Uhde, Fritz von

Gebhard, Eduard

Kampf, Arthur

Zügel, Heinrich

Stuck, Franz

3. Great Britain.

The chief aim of British art during the early nineteenth century was historical pictures of an academic order. Landscape painting culminated in Turner and Constable. A reaction against the academic came about through the Pre-Raphaelites (q. v.), who introduced spiritual and realistic elements. The chief influence in recent years has been French. See:

Raeburn, Sir Henry

Lawrence, Sir Thomas

Hoppner, John

Haydon, Benjamin Robert

Eastlake, Sir Charles

Blake, William

Wilkie, David

Turner, J. M. W.

Crome, John

Constable, John

Rossetti, Dante Gabriel

Hunt, William Holman

Burne-Jones, Sir Edward

Millais, Sir John Everett

Watts, George Frederick

Herkomer, Hubert

Leighton, Frederick, Lord

Alma-Tadema, Lawrence

Orchardson, W. Q.

Lavery, John

Hornell, Edward

Shannon, James J.

4. Other Countries.

In other European countries the development through the Classical, Romantic, and Naturalistic stages was not dissimilar to those already described. All have profited by French technical methods, and are, to a greater or less extent, swayed by Realistic and Impressionistic tendencies. See:

(a) Belgian and Dutch:

Gallait, Louis

Leys, Baron Hendrik

Wiertz, Antoine Joseph

Stevens, Alfred

Lempeols, Jeff

Khnopff, Fernand

Israels, Josef

Mesdag, Hendrik

Mauve, Anton

Maris, The Brothers

Gogh, Vincent van
Toorup, Jan

(b) Scandinavian and Russian:

Zorn, Anders
Larsson, Carl
Liljefors, Bruno
Kroyer, Peter Severin
Thaulow, Frits
Vereshtchagin, Vassili
Repin, Ilia Yefimovitch

(c) Spanish, etc.:

Fortuny, Mariano
Sorolla, Joaquin
Segantini, Giovanni

5. *United States.*

During the Colonial period and immediately after the Revolution, British influences prevailed in the United States, with an inclination to follow the Italians in larger subjects. An indigenous art began with the self-taught Hudson River School, about 1825. Then came the foreign influence, and, since 1875, French methods have been quite generally adopted, the natural characteristics revealing themselves in choice of subject and conceptions.

(a) Early Period:

West, Benjamin
Copley, John Singleton
Peale, Charles Wilson
Trumbull, John
Stuart, Gilbert
Allston, Washington
Peale, Rembrandt
Sully, Thomas
Jarves, John Wesley

(b) Middle Period:

Hudson River School of Painting
Cole, Thomas
Durand, Asher Brown

Kensett, John Frederick
Church, Frederick Edwin
Bierstadt, Albert
Moran, Thomas
Harding, Chester
Neagle, John
Inman, Henry
Huntington, Daniel
Fuller, George
Ryder, Albert P.
Johnson, Eastman
Brown, John G.
Mount, William Sidney
Leutze, Emanuel
Hicks, Thomas
Hunt, William Morris
Homer, Winslow
Inness, George
Wyant, A. H.
Martin, Homer D.

(c) Third, or Cosmopolitan, Period:

(i) Figure and Portrait:

Whistler, James Abbott Mc-
Neil
Abbey, Edwin A.
Sargent, John Singer
Vedder, Elihu
Duvenceck, Frank
Dielman, Frederick
Chase, William Merrit
Eaton, Wyatt
Weir, James Alden
Thayer, Abbott
Brush, George De Forest
Tarbell, Edmund
Benson, Frank Weston
Dewing, Thomas W.
Blum, Robert F.
Walker, Horatio
Remington, Frederick
Couse, E. Irving
Wiles, Irving
Alexander, John W.

Decamp, Joseph R.
 Eakins, Thomas
 Beaux, Cecilia
 Harrison, (Thomas) Alexander
 Melchers, Gari
 Cassatt, Mary

(ii) Landscape:

Dewey, Charles Melville
 Blakelock, Ralph
 Dearth, Henry Golden
 Wiggins, Carlton
 Robinson, Theodore
 Bunce, William Gedney
 Murphy, John Francis
 Crane, Bruce
 Harrison, (Lovell) Birge
 Twachtman, John Henry
 Dougherty, Paul
 Hassam, Childe
 Foster, Ben
 Schofield, W. Elmer
 Redfield, Edward Willis
 Symons, Gardner
 Chapman, Carlton T.
 Waugh, Frederick Judd
 Carlsen, Emil

(iii) Mural Painting (q. v.):

La Farge, John

Cox, Kenyon
 Blashfield, Edwin H.
 Mowbray, Henry Siddons
 Rogers, H. O.
 Millet, Frank D.
 Oakley, Violet

(iv) Recent Tendencies:

Henri, Robert
 Bellows, George
 Lie, Jonas
 Lawson, Ernest
 Mora, Luis
 Hawthorne, Charles W.
 Miller, Richard E.
 Friesecke, Frederick Carl
 Dabo, Léon

VI. PASTEL, WATER-COLOR, AND MINIATURE PAINTING.

The basis of study should be the general articles on these three varieties of painting, which discuss their technique and history and enumerate the principal artists. The most important of the latter are treated as special titles, to which reference should be made.

Chapter 12. The Minor Arts

A. Engraving

Engraving is the art of producing on a hard surface, such as stone, metal, or wood, incised or relief designs. These may be for purposes of decoration, as in the case of engraved bronzes and silverware, or for stamping a soft substance, as seal rings. But engravings are usually made for the purpose of printing upon paper, and it is this variety with which we are chiefly concerned.

Printing is done either from incised designs to which the ink is applied, or from relief designs, which thus produce the image. In the first process, metal plates, usually of copper, are used; the principal varieties are Line-Engraving and Etching, to which may be added Dry Point, *Manière Criblée*, and Stipple. The chief form of Engraving in relief is Wood-Engraving; and there are mixed processes, like Aquatint, Mezzotint, and Soft-Ground Etching. The trial impressions upon paper are called the proofs, and the final result the print. The article ENGRAVING contains a general sketch of the subject. See also:

Line Engraving

Etching

Dry Point

Manière Criblée

Stipple

Wood Engraving

Aquatint

Mezzotint

Soft-Ground Etching

Print Proof

I. LINE ENGRAVING.

Line Engraving is done with the burin, usually upon a copper plate. It

originated simultaneously in Italy and Germany during the early fifteenth century, probably with the goldsmiths, from the custom of printing trial impressions of niello plates. (See NIELLO.) The earliest line-engravings are mere outline drawings without light or shade. In the early sixteenth century, the art culminated in the works of Albrecht Dürer in Germany, Lucas van Leyden in Holland, and Marcantonio Raimondi in Italy. During the seventeenth century, especially under Louis XIV, France was predominant. But artists devoted themselves increasingly to the reproduction of great paintings instead of original designs. For this reason, the art has gradually sunk into disuse, its place being taken by photographic processes. See:

Line-Engraving (basis of study)

Burin

Niello

1. Italy:

Finiguerra, Tomaso

Jacopo dei Barbari

Mantegna, Andrea

Raimondi, Marcantonio

Carracci, Agostino

Piranesi, Giambattista

Morghen, Raffaello

2. Germany; Netherlands:

Schongauer, Martin

Dürer, Albrecht

Lucas van Leyden

Beham, Hans Sebald

Beham, Barthel

Vorsterman, Lucas

Chodowiecki, Daniel

3. *England:*

Strange, Sir Robert
Vertue, George

4. *France:*

Bosse, Abraham
Nanteuil, Robert
Masson, Antoine
Audran, Gérard
Cochin, Charles Nicolas
Forster, François
Henriquel-Dupont, Louis Pierre
Gaillard, Claude Ferdinand

II. ETCHING.

In etching, the plate is covered with the ground, usually a varnish, into which the design is scratched with an etching-needle. The plate is then immersed in an acid, which eats the design into the metal. The finishing touches are often done by the dry-point process, a simple scratching of the plate without the use of ground or acid.

Etching upon steel armor, etc., was practiced in the Middle Ages. Dürer was one of the first to use etching for printing purposes, and the art reached its highest development in Holland during the seventeenth century. Many eminent painters practiced it, among whom was the greatest etcher of all times, Rembrandt. Next to Holland, etching was principally cultivated in France, beginning with Claude Lorrain's landscapes. The art found a revival in the nineteenth century, especially in France, but also in England, Germany, and the United States. The following list cites only the principal etchers and a few of the important painters who have practiced etching. See *Etching* (basis of study):

1. *Netherlands:*

Lucas van Leyden
Velde, Esaias van de
Rembrandt
Ruisdael, Jacob
Potter, Paul
Van Dyck, Anthonis

2. *France:*

Gelée, Claude (Claude Lorrain)
Flameng, Leopold
Rajon, Paul
Méryon, Charles
Jacquemart, Jules Ferdinand
Legros, Alphonse
Helleu, Paul

3. *Germany:*

Hollar, Wenzeslas
Unger, William
Klinger, Max
Thoma, Hans
Liebermann, Max

4. *Spain:*

Goya, Francisco

5. *England:*

Geddes, Andrew
Wilkie, Sir David
Turner, J. M. W.
Hamerton, Philip Gilbert
Haden, Francis Seymour
Menpes, Mortimer
Brangwyn, Frank

6. *United States:*

Whistler, James Abbott McNeil
Pennell, Joseph
Moran
Parish, Stephen
Platt, Charles A.
Webster, Herman A.

III. WOOD ENGRAVING.

In early Wood Engraving, the design, and the early wood engraving at-

block, and all the wood was cut away except the design, which remains in relief. The process is of peculiar importance because it can be used in connection with printing from movable types.

Crude outline prints from wood-cuts were common in Southern Germany and the Netherlands in the early fifteenth century. The art received an impetus from the invention of printing, and the early wood-engraving attained its most perfect development during the early sixteenth century in the works of Albrecht Dürer and Hans Holbein in Germany. It was introduced by German artists into Italy; but here only the chiaroscuro process attained a high degree of proficiency. (See paragraph *Chiaroscuro* under WOOD ENGRAVING.) Wood engraving flourished also in the Netherlands and in France.

Modern wood engraving is done on the cross-grain of boxwood, and with a graver instead of the knife. The design is cut away instead of being left in relief, appearing in white lines. The father of the art was the Englishman, Thomas Bewick (died in 1828), although his pupils achieved much as book illustrators. The art has, during late years, succumbed in England to the more accurate photographic processes. Present German wood engraving is, generally speaking, precise and careful in execution; but the French school has attained the highest artistic perfection.

Before the Civil War, America produced several prominent wood engravers whose work resembled contemporary British. But after 1870, in connection with the popular magazines, a

school, headed by Timothy Cole, arose which reproduced the effect of paintings, drawings, etc., with remarkable fidelity, and used the technical proficiency acquired to render portraits and landscapes. Since the perfection of the photographic processes, wood engravers have returned to a more legitimate practice of their art wood engraving. See:

1. *Germany*:

Dürer, Albrecht
 Burckmair, Hans
 Schüffelein, Hans
 Holbein the Younger
 Lützelburger, Hans
 Cranach, Lucas
 Altdorfer, Albrecht
 Beham, Hans Sebald
 Aldegrever, Heinrich
 Baldung, Hans
 Menzel, Adolf
 Richter, Ludwig

2. *France*:

Cousin, Jean
 Charpentier, François
 Bracquemond, Joseph Auguste
 Jannot, Tony
 Grandville
 Gavarni
 Doré, Gustave

3. *Italy*:

Carpi, Ugo da
 Andreani, Andrea

4. *England*:

Bewick, Thomas
 Blake, William
 Linton, William James

5. *United States*:

Anderson, Alexander
 Smillie, James D.

Danforth, Moseley Isaac
 Cole, Timothy
 Juengling, Frederick
 Kruell, Gustav
 Wolf, Henry

IV. LITHOGRAPHY.

In lithographic processes, the design is drawn with crayon or fatty ink upon a porous stone or metal, possessing the property of retaining fatty substances and water to the evaporating point. The remainder of the stone is moistened with water. A roller covered with fatty printing ink will retain only the design, being repelled by the moist portions. Lithography was invented in 1798, by Aloys Senefelder, at Munich. Since the invention of the power press, it has become a world-wide industry. See:

Lithography
 Senefelder, Aloys
 Whistler, James Abbott McNeil
 Pennell, Joseph

The principal artists cited under LITHOGRAPHY.

V. PHOTO-ENGRAVING.

This is a mechanical process in which the plates are prepared from a photographic negative by means of the action of light upon gelatine and other substances. It may be intaglio, in which the French name photogravure is used, or relief. The finishing touches are done by hand. The half-tone process, now generally used for purposes of illustration, is done on plates of ruled lines of extreme fineness. See PHOTO-ENGRAVING.

VI. ILLUSTRATION.

The article ILLUSTRATION treats the decoration and illustration of books,

and its history from the Egyptian papyri to the modern newspaper. This should be supplemented by ILLUMINATED MANUSCRIPTS, treating especially the Middle Ages and Renaissance. With the invention of printing, wood engraving (q. v.) became the principal means of illustration. Since 1850 photo-engravings have been increasingly used, and, in recent years, colored illustrations, some of great beauty, have been produced, especially in the leading magazines. The article CARICATURE describes in detail the important influence of that factor of illustration. The principal illustrators are enumerated there, under WOOD-ENGRAVING, and in the list subjoined.

1. *France:*

Callot, Jacques
 Daumier, Honoré
 Gavarni
 Cham
 Caran d'Ache
 Forain, Jean Louis
 Willette, Léon Ad phe

2. *England:*

Gilray, James
 Cruikshank, George
 Doyle, John
 Leech, John
 May, Phil
 Du Maurier, George
 Tenniel, Sir John
 Crane, Walter
 Beardsley, Aubrey Vincent

3. *United States:*

Nast, Thomas
 Gibson, Charles Dana
 Christy, Howard Chanler
 Fisher, Harrison
 Flagg, James Montgomery

Chapter 13. Music

TO appreciate music requires chiefly a receptive temperament. Obviously, the more one understands of the technique whereby certain harmonious results are produced, the greater will be the enjoyment of those results. But, irrespective of the critical interest in music, its first appeal must be, and is, to the imagination and the emotions. The layman in the audience is not thrilled by the cold, technical fact that the violinist, yonder on the stage, is producing that wonderfully soft, birdlike note by the infinitesimal, *even* pressure of his little finger on the highest possible note of the A string. The musicians, the violinists, the critics, realize the years of study that have contributed to the production of that perfect note, and their admiration is greater, but their enjoyment of the emotional result is no more keen, than that of the musical proselyte beside them.

This theory, which is based on actualities, finds its logical expression in the system that has been adopted in outlining the department of Music in the *New International Encyclopædia*. There is, first, a synopsis of the articles which would interest the general reader by giving an historical and appreciative résumé of music as an art. The second subdivision is more especially for the student, or for the reader who desires to master the technique and science of music, in order that he may "see with an understanding eye" and hear with a critical nicety of discrimination.

1. INTRODUCTORY.

Music
Music, History of
Sacred Music
Opera (with the accompanying
lists of operas)
Oratorio (with the accompany-
ing list of oratorios)
Instrumental Music
Musical Instruments (with cross
references to individual arti-
cles or instruments, under
their own names)
Orchestra
Score
Band
Band, Military
Organ
Pianoforte
Violin
Singing

Dancing (with cross references
to separate articles)

2. HISTORICAL.

Folk-Music
Egyptian Music
Hindu Music
Chinese Music
Japanese Music
Hebrew Music
Greek Music
Magyar Music
Arabian Music
Scandinavian Music
Slavonic Music
Spanish Music
Janizary Music
Celtic Music
Finnish Music
Scotch Music
Indian Music
Negro Melodies

Minnesinger
 Troubadours
 Trouvère
 Waits
 Ambrosian Chant
 Gregorian Chant
 Hymnology
 National Hymns

3. MUSICAL ORGANIZATIONS, ETC.

Guilds, Musical (under Guild)
 Conservatory
 Conductor
 Precentor
 Musical Festival
 Gesellschaft der Musikfreunde
 Gewandhaus-Concerte
 Leeds Musical Festival
 Choral Societies
 Handel and Haydn Society
 Oratorio Society
 Singakademic
 Philharmonic Societies
 Boston Symphony Orchestra
 Société des Concerts du Conservatoire
 Sons of the Clergy Musical Festival
 Chicago Symphony Orchestra
 Cincinnati Symphony Orchestra
 Minneapolis Symphony Orchestra
 Three Choirs Festival
 Bethlehem, Musical or Bach Festival
 Worcester Musical Festival
 Peterboro Musical Festival
 Bayreuth Musical Festival

4. THE ART-FORMS.

Canon
 Cantata
 Catch
 Chaconne

Chamber Music
 Chant
 Chorale
 Concerto
 Cyclical Forms
 Duet
 Étude
 Fantasia
 Form
 Fugue
 Glee
 Humoreske
 Imitation
 Incidental Music
 Interlude
 Intermezzo
 Introduction
 Legend
 Leitmotiv
 Lied
 Musical Drama
 Nocturne
 Offertory
 Overture
 Paraphrase
 Passion
 Pasticcio
 Postlude
 Pot-pourri
 Prelude
 Programme Music
 Quartet
 Recitative
 Requiem
 Rhapsody
 Rondo
 Scherzo
 Serenade
 Singspiel
 Solo
 Sonata
 Song
 Suite
 Symphonic Poem

Symphony

Trio

Variation

Virginal

Transposing Instruments

Valves in Musical Instruments
(under Valve)

Voice

See also PIANO, ORGAN, SINGING,
and MUSICAL INSTRUMENTS.

5. DEFINITIONS AND DESCRIPTIONS OF TERMS AND PROCESSES USED IN THE INTERPRETATION OF MUSIC.

Musical Dictation

Beat

Baton

Rest

Tempo

Temperament

Rhythm

Syncopation

Expression

Musical Notation

Modulation

Intonation

Fingering

Position

Touch

Phrasing

Slide

Swell

Register

Augmentation

Movement

Passing Notes

Tremolo

Trill

Treble

Bass

Neumes

Value

Clang Tint, Explanation of

Finger-board

Clavichord

Janko Keyboard

Harpsichord

Manual

Metronome

Pedal

String

6. MISCELLANEOUS AND TECHNICAL ARTICLES.

The reader who has followed the course outlined in the earlier subdivisions, will find that the following articles are mainly specialized statements of general principles with which he is already familiar:

HARMONY :

Antiphony

Bar

Cadence

Cantus Firmus

Chord

Chromatic

Clef

Coda

Consonance

Degree

Diatonic Scale

Diazeutic Tone

Discord

Dissonance

Dominant

Figured Bass

Finale

Flat

Fundamental Note

Grace-notes

Guidonian Hand

Harmonics

Homophony

Improvisation

Instrumentation

Interval

Invention
 Inversion
 Key
 Leading Tone
 Leading of Voices
 Leger-Lines
 Major
 Measure
 Mediant
 Melody
 Meloplaste
 Melos
 Mensurable Music
 Metre
 Minor
 Mixed Cadence
 Modes
 Monody
 Motion
 Motive
 Natural
 Nuances
 Numerical Notation
 Octave
 Organ-Point
 Organum
 Part
 Part-music
 Passage
 Passing Notes
 Pitch
 Plain Chant
 Polyphony
 Preparation
 Principal
 Progression
 Reed
 Relationship
 Scale
 Semitone
 Sequence
 Sharp
 Solmization
 Subdominant

Suspension
 Tablature
 Theme
 Tierce
 Tonality
 Tone
 Tonic
 Tonic Sol-fa
 Touch
 Transcription
 Transposition
 Triad
 Triplet
 Typical Phrase
 Unison
 Variation

BIOGRAPHY.

A selected list of the world's great composers would include the following names :

Adam, A. C.
 Agricola, M.
 d'Albert, E.
 Allegri, G.
 Anerio, F.
 Animuccia, G.
 Arcadelt, J.
 Arne, T. A.
 Auber, D. F. E.
 Bach, J. S.
 Bach, K. P.
 Balfe, M. W.
 Barnby, J.
 Beethoven, L.
 Bellini, V.
 Benedict, J.
 Bennett, W. S.
 Berlioz, H.
 Bizet, G.
 Boieldieu, F. A.
 Bononcini, G. B.
 Brahms, J.
 Bruneau, A.

- Bull, J.
Buxtehude, D.
Caccini, G.
Cambert, R.
Carissimi, G.
Cavalieri, E.
Cherubini, M. L.
Chopin, F. F.
Cimarosa, D.
Clementi, M.
Corelli, A.
Cornelius, P.
Couperin, F.
Cui, C.
David, F. C.
Debussy, C.
Deprès, J.
Donizetti, G.
Durante, F.
Dvorák, A.
Elgar, E.
Enna, A.
Festa, C.
Field, J.
Flotow, F.
Franck, C.
Franz, R.
Frescobaldi, G.
Froberger, J. J.
Gabrieli, A.
Gabrieli, G.
Gade, N. W.
Gibbons, O.
Giordano, U.
Glinka, M. I.
Gluck, C. W.
Goldmark, K.
Gossec, F. J.
Goudimel, C.
Gounod, C. F.
Graun, K. H.
Grétry, A. E. M.
Grieg, E.
Halévy, J. F.
Handel, G. F.
Haydn, J.
Hérold, L. J. F.
Hiller, J. A.
Hofhaimer, P.
Humfrey, P.
Hummel, J. N.
Humperdinck, E.
d'Indy, V.
Ippolitov-Ivanov, M.
Isaak, H.
Isouard, N.
Jommelli, N.
Keiser, R.
Kiel, F.
Lalo, E.
Lasso, Orlando di
Leo, L.
Leoncavallo, R.
Le Sueur, J. F.
Liszt, F.
Logroscino, N.
Lortzing, G. A.
Lotti, A.
Lully, J. B.
MacDowell, E. A.
Mahler, G.
Marschner, H.
Mascagni, P.
Massenet, J. E. F.
Mendelssohn-Bartholdy, F.
Meyerbeer, G.
Monteverde, C.
Morley, T.
Mozart, W. A.
Mussorgsky, M.
Nanini, G. M.
Offenbach, J.
Okeghem
Pachelbel, J.
Paisiello, G.
Palestrina, G. P.
Pergolesi, G. B.
Piccini, N.

Ponchielli, A.
Porpora, N. A.
Prätorius, M.
Puccini, G.
Purcell, H.
Raff, J.
Rameau, J. P.
Reger, M.
Rimski-Korsakov, N.
Rossini, G. A.
Rubinstein, A.
Sacchini, A. M.
Saint-Saëns, C. C.
Scarlatti, A.
Schubert, F.
Schumann, R.
Schütz, H.
Sibelius, J.
Sinding, C.
Smetana, F.
Spohr, L.
Spontini, G. L.
Strauss, J.
Strauss, R.
Sullivan, A. S.
Suppé, F.
Tchaikovsky, P. I.
Thomas, A.

Tartini, G.
Verdi, G.
Viotti, G. B.
Volkman, R.
Wagner, R.
Wallace, W. V.
Weber, K. M.
Williaert, A.
Wolf, H.
Zingarelli, N. A.

NOTE—The names of famous operas, oratorios, symphonies, dances, and national hymns have been omitted from the above classification. In the majority of cases, they will be found under their own proper titles, although brief mention of them would also be found in the general articles OPERA, ORATORIO, SYMPHONY, and NATIONAL HYMNS. The same is true of the scores of musical instruments and musical directions whose names will be found under the general articles ABBREVIATIONS, MUSICAL INSTRUMENTS and TEMPO.

Chapter 14. Mathematics

ROUGHLY defined, mathematics is the science of forms and number. A few of the definitions given by eminent mathematicians are found in the general article MATHEMATICS, which is, therefore, a suitable introduction to the subject. The article gives a condensed history of mathematics, from earliest times to the present, together with a logical classification of the various branches of mathematics.

Mathematical science naturally falls into two main subdivisions: Pure Mathematics and Applied Mathematics. With this division as a basis, various classifications have been attempted. The best classification for the purpose of systematic reading is the one usually followed in the school curriculum, or in the text-books. In accordance with this, we may subdivide Elementary Mathematics into the following branches:

Arithmetic

Algebra

Geometry

Trigonometry

Analytic Geometry

Calculus

Division

Arithmetic Signs

Fraction

Involution and Evolution

Proportion

Checking in Arithmetic

Calculating Machines

Slide Rule

1. ARITHMETIC involves three phases: The conception of number, the representation of number by symbols, and the principles and methods of computation. A general discussion of these phases, together with their history, is given in the article ARITHMETIC, which, therefore, should be read as an introduction to this branch.

A more modern phase of arithmetic is computation by calculating machines. This process has already to a large extent replaced computations by hand, and seems to be destined to do so even more in the future.

The general articles bearing on this branch may be conveniently read in the following order:

(a) *Principles and Methods of Computation:*

Addition

Subtraction

Multiplication

(b) *Symbols, Representation, and Scales:*

Symbols

Numerals

Decimal System

Scales of Notation

(c) *Theory of Numbers:*

Number

Irrational Number

Complex Number

The detailed history of these topics is given separately in each article.

2. ALGEBRA is universal arithmetic, and has many features in common with arithmetic. The fundamental operations are the same, with the exception that algebra takes up the more general cases. The limitations of algebra are brought out in the general article ALGEBRA, where also a history of this branch is given. Since algebra and

arithmetic are so closely related, the fundamental operations are best treated together, and so the general articles bearing on the fundamental operations in algebra have been given under arithmetic. Those belonging almost exclusively to algebra are best taken up in the following order:

Coefficient
Factor
Exponent
Associative Law
Polynomial
Negative Quantity
Binomial
Binomial Coefficients
Binomial Theorem
Remainder Theorem
Equation
Elimination
Substitution
Diophantine Analysis
Series
False Position, Rule of
Cubic Equation
Biquadratic Equations
Permutations and Combinations
Probability
Determinants
Logarithms
Analysis

3. GEOMETRY is the science of form, and geometric concepts arise from the consideration of forms of objects just as numerical concepts arise from considering a collection of objects. Geometry is independent of algebra, and may be studied before or after algebra, but preferably after. The physical scientist considers only the space we live in, while the mathematician considers all possible spaces. Accordingly, we have many different kinds of geometry. A general classification and dis-

cussion of the several geometries is given in the article GEOMETRY. Although algebra and geometry are independent, a correspondence may be set up between them. This is brought out in the article CORRESPONDENCE. The general articles are best read in the following order:

Euclid
Axiom
Theorem
Problem
Corollary
Angle
Arithmetic and Geometric Signs
Equiangular
Equilateral
Congruence
Duality
Construction
Locus
Triangle
Circle
Quadrilateral
Polygon
Circumscribed and Inscribed Figures
Contact
Perimeter
Transversal
Antiparallels
Concurrence and Collinearity
Maxima and Minima
Similarity
Symmetry
Plane
Octahedron
Polyhedron
Projective Geometry
Projection
Homology
Perspective
Isoperimetric Figures
Engineering Instruments
Surveying

Planimeter
Mensuration

Protractor

Vernier

Quadrature

Weights and Measures

Duplication of Cube (under Cube)

Quadrature of Circle (under Quadrature)

Trisection of an Angle

4. **TRIGONOMETRY** in elementary mathematics deals with the study of triangles, and the measurement of their sides, angles, and areas. This is, however, only a part of the general subject. Under the article **TRIGONOMETRY**, almost a whole text-book treatment is given, together with a short history of the subject from earliest times. As an introduction, read the article **LOGARITHMS**. An elementary knowledge of algebra and geometry is, however, necessary before the study of trigonometry can be taken up.

5. **ANALYTIC GEOMETRY** is the application of algebra to geometry, and the combination of the two is the most powerful tool of the modern mathematician. More general results may be deduced, and better classification effected, by means of analysis. In the general article **ANALYTIC GEOMETRY**, the aim and general method of procedure is given, together with a short history of the subject. The other articles may be conveniently read in the following order:

Coördinates
Graphic Method
Curve
Analysis
Cartesians
Parameter
Locus

Contact

Normal

Tangent

Conic Sections

Circle

Pole and Polar

Parabola

Ellipse

Hyperbola

Surface

Cone

Conoid

Spheroid

Generation

Higher Plane Curves:

In these, are included all transcendental and all algebraic curves above the second order. As an introduction, read the article **CURVE**. Some of the most important articles are:

Cardioid
Catenary
Cisoid
Conchoid
Curve of Sines
Cycloid
Logarithmic Curve
Spiral
Lemniscate
Loxodrome
Witch

6. **CALCULUS**. This term usually refers to **Differential and Integral Calculus**. **Differential Calculus** deals with the relation between indefinitely small quantities or infinitesimals, and is of great service when the quantities under consideration are constantly changing. The problem of **Integral Calculus** is the inverse of that of **Differential Calculus**. **Integral Calculus** also deals with the application of calculus to mechanics and geometry.

In the general article **CALCULUS**, the methods and applications of calculus are illustrated by the solution of practical problems. As a historical introduction, read:

Indivisibles (under Cavalieri)

Fluxions

The general article **CALCULUS**, should also be preceded by:

Analysis

Limits, Theory of

Infinity and the Infinitesimal

and followed by:

Maclaurin's Theorem (under Maclaurin)

Curve

Osculation

Quadrature

Differential Equations (under Equation)

7. **HIGHER MATHEMATICS** is a collective term for all branches of mathematics that follow calculus. Most of these branches are based on calculus, but some, like the theory of numbers and group theory, are independent of calculus. The following articles will furnish an introduction to some of the branches of higher mathematics:

Forms

Functions

Modern Geometry (under Geometry)

Non-Euclidean Geometry (under Geometry)

Quaternions

Substitution

Theory of Numbers (under Number)

8. **APPLIED MATHEMATICS** deals with the application of mathematics to related sciences, like Mechanics, Astronomy, Physics, etc. See these departments in this work.

9. **BIOGRAPHY.** Mathematical knowledge dates back to the Egyptian and Babylonian civilizations, but the real development begins in Greece. This was chiefly in the realms of geometry. Later it inclined toward arithmetic. The Romans did nothing for mathematics, and the Arabs very little more than to translate and preserve the Greek learning. Through them it was introduced into the cloisters in Europe during the Middle Ages. The modern period in the history of mathematics begins with Descartes's invention of analytic geometry. The following is a list of the most eminent mathematicians, arranged according to their nationality or period:

(a) *Greek:*

Thales

Pythagoras

Aristotle

Plato

Euclid

Archimedes

Diocles

Nicomedes

Hippias of Elis

Menelaus

Apollonius of Perga

Hero of Alexandria

Ptolemy

Diophantus

Pappus

(b) *Arab:*

Al-Khuwarizmi

Al-Battani

(c) *Hindu:*

Aryabhata

Brahmagupta

Bhaskara
Mahavir

(d) *Persian:*

Omar Khayyam

(e) *From the revival of Mathematics
in Europe to the middle of the
17th century:*

Gerbert[under Sylvester(Pope)]
Fibonacci
Jordanus
Peurbach
Regiomontanus
Paccioli
Tartaglia
Cardan
Viète
Napier
Descartes

(f) *From the middle of the 17th cen-
tury to the present time:*

Desargues
Cavalieri
Pascal
Boscovich
Fermat
Wallis
Barrow, I.
Leibnitz
Newton
Bernoulli, Jakob
Bernoulli, Johann

Bernoulli, Niclaus
Bernoulli, Daniel
Maclaurin
Taylor
Euler
D'Alembert
Monge
Laplace
Lagrange
Legendre
Fourier
Gauss
Poisson
Poncelet
Chasles
Steiner
Cauchy
Möbius
Lobachevsky
Bolyai
Abel
Dirichlet
Hamilton
Jacobi
Plücker
Grassmann
Galois
Cayley
Eisenstein
Weierstrass
Riemann
Smith, H. J. S.
Sylvester
Clebsch
Lie, Sophus
Reye

Chapter 15. Astronomy

ASTRONOMY is the science which treats of the heavenly bodies—the sun and moon, the planets and their satellites, comets and meteors, the stars and nebulae. Astronomy is usually divided into many branches; these branches, however, are not distinct and separate, but overlap in all directions, so that no convenience as regards treatment is gained. The arrangement of the articles in the following lists is not according to branches, but in accordance with the order in which they may be conveniently read.

A general history of the progress of astronomical discovery is given in the general article ASTRONOMY, which, therefore, forms a suitable introduction to the subject. For a knowledge of a few of the elementary terms used in astronomy, see:

Zenith
Horizon
Equator
Ecliptic
Pole
Azimuth
Altitude
Declination
Latitude and Longitude
Parallels
Meridian
Diurnal Motion
Culmination

1. ASTRONOMICAL OBSERVATIONS.

Astronomical observations are principally of two kinds: To determine distance, linear and angular; and to study the physical conditions of the heavenly bodies.

(a) Instruments:

Telescope
Sextant
Transit Instrument
Meridian Circle
Equatorial
Zenith Telescope
Micrometer
Chronograph

Chronometer
Spectroscope

(b) *Corrections to Astronomical Observations:*

Depression
Parallax
Refraction
Twilight
Aberration

(c) *Time:*

The determination of time is one of the most important problems in astronomy, and is effected by observing the time of transit across the meridian of some celestial object. For the determination of time, read:

Transit Instrument
Sextant
Chronometer
Ephemeris
Equation of Time

Various ways of reckoning time have been used in history. Some of the principal ways used by the ancients, and also those used at present, are given in the following articles:

Period
Chronology

Calendar
Hour
Week
Day
Month
Year
International Date Line
Prime Meridian Conference
Time Signals
Time, Standard

Eros
Moon
Gravitation
Parallax
Lunar Theory
Nutation
Perturbations
Precession
Tides
Latitude, Variation of
Seasons
Orbit
Elements
Eclipse

2. THE SOLAR SYSTEM.

The solar system consists of the sun as a central body, around which revolve the planets with their satellites, some periodic comets, and meteoric swarms. In addition to these permanent members, the system is occasionally visited by other comets, which move in parabolic orbits. As a historical introduction, read:

Ptolemaic System
Copernican System

Of the members of the solar system, the planetary system is of most immediate interest to us, since our earth is a member of this system. The sun and the planets, with their satellites and their interrelations, are treated in the following articles:

Sun
Planets
Solar System
Planetoids
Satellites
Vulcan
Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune

COMETS are usually very small in mass, though this has great extent. They move in very eccentric orbits about the sun, and the planes of their orbits present a great variety. The constituent parts and physical characteristics, the mass, the spectra, the number, discoveries, the capture theory, and origin of comets are treated in the article COMET.

METEORS are masses of stone or iron, which sometimes are seen to fall to the earth from the sky. The circumstances of the fall, the meteoric showers, the probable cause, the matter, path, and number of meteors are treated in the articles:

Meteors
Aërolite

3. THE STARS.

These bodies are usually called fixed stars, owing to the idea of the ancients that they were without motion. The fixity is, however, now disproved, and observations with the spectroscope show that they are moving with velocities comparable to those of bodies belonging to the solar system. Owing to

their immense distance, they appear, however, to keep their relative positions and configurations unchanged. This is only apparent, and there are stars whose displacement amounts to as much as 1" a year. In magnitude and physical condition, the stars are comparable with our sun, and many of them greatly exceed our sun in brightness and magnitude. The designation, magnitude, nature, and number of stars, the constellations, stellar parallax, proper motion, spectra, photometry, variable stars, double and multiple stars, binary stars, etc., are treated in the following articles:

Star
 Constellation
 Culmination
 Pole Star
 Zodiac
 Galaxy
 Parallax
 Variable Star
 Astro-Photography

THE NEBULÆ are faintly shining cloudlike patches of matter in the sky, scattered among the stars. They are supposed to be stars under formation. The nature, forms, and magnitudes of nebulae, the spectra, distribution, distance, etc., are treated in the article NEBULÆ.

4. ASTRONOMICAL OBSERVATORIES are buildings where the instruments and machinery necessary for the observation of the heavenly bodies are kept. The equipment, location, etc., together with a description of some of the largest observatories in the world, are treated in the following articles:

Observatory
 Lick Observatory

Naval Observatory
 Pulkova
 Yerkes Observatory
 Greenwich Observatory
 Harvard College Observatory
 Mount Wilson Solar Observatory

5. COSMOGONY deals with the theory of operations by which the present condition of the universe came about. Various systems of cosmogony have prevailed at different times. See:

Cosmogony
 Nebulae

6. ASTROLOGY deals with the supposed influence of the heavenly bodies upon human affairs and the drawing of horoscopes. Astrology was the forerunner of astronomy, and for centuries astronomical observations were made mainly to supply data for astrology. See ASTROLOGY.

7. BIOGRAPHY.

Observational astronomy dates back to the Chinese and Chaldeans, but the first real attempt to explain the movements of the heavenly bodies is due to the Greeks. The ideas of the Greeks held sway till Copernicus substituted a more harmonious system. Gravitational astronomy begins with Newton, who made it possible to explain the movements of the heavenly bodies, while Galileo's invention of the telescope gave a means of finding out what they are in themselves. The following is a list of the most prominent contributors to astronomy:

Hipparchus
 Ptolemy
 Brahe
 Kepler
 Galileo

Galileo
Newton
Bradley
Halley
Roemer
Cassini, Jacques
Cassini, G. D.
Flamsteed
Herschel, Sir William
Herschel, Sir J. F. W.
Laplace
Bessel
Bode
Delambre
Olbers
Piazzi
Pond

Baily
Hansen
Struve, F. G. W.
Encke
Leverrier
Adams, J. C.
Airy
Rosse
Rutherford
Struve, Otto
Galle
Huggins
Lockyer
Gill, Sir David
Pickering
Hale, G. E.

Chapter 16. Physics

IN undertaking systematic reading in any particular science, it is well at the outset to realize the province and limitations of that science, as they have been determined and observed in the past by its devotees, and what, if there have been changes, is the modern conception of the scope of the particular department of knowledge so known. With this especial object, the article on PHYSICS has been written, and serves to introduce the reader to the subject, as discussed in more detail under the broad subdivisions of ACOUSTICS, ELECTRICITY, HEAT, LIGHT, MECHANICS, LABORATORY, MAGNETISM and RADIOACTIVITY. Taking up these subjects separately, and also the article on LABORATORY, we shall find in each case the general article referred to, and such minor articles as are demanded.

1. ACOUSTICS.

Dealing with theoretical questions, the more important topics on the nature and theory of sound are included in the following list:

- Acoustics
- Section *Origins* under Music
- Diatonic Scale
- Phonetics
- Resonance
- Resonator
- Node

For special purposes and investigation dealing with the production and propagation of sound waves, there has been devised much interesting apparatus, certain forms of which, as the telephone, phonograph, megaphone, etc., have found their way into universal application. See:

- Siren
- Speaking Trumpet
- Megaphone
- Ear-Trumpet
- Acoumeter
- Phonograph
- Talking Machine
- Graphophone
- Telephone
- Tuning-Fork
- Organ

2. ELECTRICITY.

To supplement the general article ELECTRICITY, and those of a theoretical nature treating Ionization and Electrons, it is desirable to consult articles dealing with the generation of the current, as DYNAMO-ELECTRIC MACHINERY, the VOLTAIC CELL, the DRY PILE, THERMO-ELECTRICITY, and also study the effects of INDUCTION and self-induction. We can learn how the magnetic strength of a solenoid is influenced by the number of AMPERE TURNS. As supplemental, then, to the article on electricity, the following articles may be cited:

(a) *Fundamental Phenomena:*

- Current
- Conductor
- Resistance
- Shunt
- Electrostatics (under Electricity)
- Condenser
- Ampere Turns
- Solenoid
- Induction
- Induced Electric Currents (under Electricity)
- Foucault Currents

(b) *Electrical Units:*

- Electrical Units

Ampere

Volt

Ohm

Henry

Farad

Coulomb

Watt

(c) *Electrostatic Apparatus:*

Electrophorus

Electrical Machine

Electroscope

Leyden Jar (under Condenser)

Barometric Light

Brush

Elmo's Fire, Saint

(d) *Measuring Instruments:*

Galvanometer

Ammeter

Voltmeter

Voltameter

Wheatstone's Bridge

Electrometer

Electric Meters

Induction Balance

(e) *Discharge in Gases or in Vacuo:*

Anode

Discharge through Gases (under Electricity)

Geissler's Tubes

Crookes Tube

X-Rays

(f) *Electric Currents:*

Galvanic Battery

Voltaic Cell or Battery

Dry Pile

Storage Battery

Dynamo Electric Machinery

Thermo-Electricity

Thomson Effect

ence should be made to CALORIMETRY to ascertain how the amount of heat possessed by various bodies is measured, and to THERMOMETRY to learn how the temperature or degree of heat is determined. THERMODYNAMICS enables us to consider the relation between heat and work. See:

Heat

Calorimetry

Thermometry

Diathermancy

Regelation

Radiation

Thermodynamics

Spheroidal State

Of a more practical character, are those articles involving the consideration of methods and apparatus, such as those which discuss the LIQUEFACTION OF GASES and FREEZING MIXTURES. A list of this kind would include:

Cryophorus

Freezing Point

Freezing-Mixtures

Liquefaction of Gases

Melting-Point

Boiling-Point

Critical Point

Refrigeration

Zero

Thermometer

Pyrometer

Thermoscope

Microtasmeter

Radiation

Radiometer

Radiation Pressure

Bolometer

Hygrometer

Safety-Lamp

3. HEAT.

Following the arrangement already specified for the study of heat, refer-

4. MAGNETISM.

Complete articles on **MAGNETISM** in general and on **TERRESTRIAL MAGNETISM**, with charts, leave but little to be said in addition. The instruments used in studying magnetism, and especially the ship's compass, with its important adjustments, are also the subjects of further description. See:

- Magnetism
- Terrestrial Magnetism
- Diamagnetism
- Compass
- Declination
- Declinometer
- Dipcircle
- Inclination
- Isoclinic
- Isogonic
- Magnetometer
- Magnetic Elements
- Magnetic Equator
- Magnetic Observatory
- Armature
- Alloys, Magnetic
- Astatic Needle

5. LIGHT.

In the study of optics, there are numerous opportunities to branch off from a general treatment and carry on independent investigation in a particular field. Starting with the motion of the ether, known as light, we are able to study its **VELOCITY** and also the intensity. For the latter, photometers are employed, and the subject of **PHOTOMETRY** presents a record of many different instruments and methods. The useful application of light is included under **ILLUMINATION**. By reason of its wave motion when **DIFFRACTION** and **INTERFERENCE** take place **FRINGES** are formed, and also there re-

sults the phenomenon known as colors of thin plates. This principle of interference is the basis of one process of **COLOR PHOTOGRAPHY**; several processes are described under that title. In fact, numerous other examples could be cited, but reference to the following list will clearly indicate the extent of the range of subjects:

(a) *Light:*

- Light
- Velocity of Light
- Ether
- Diffraction and Diffraction Gratings
- Interference
- Fringes
- Colors of Thin Plates (under Light)
- Newton's Rings
- Photometry
- Reflection
- Caustic
- Refraction
- Polarization
- Prism
- Dispersion
- Color
- Complementary Colors
- Achromatism
- Rainbow
- Lens
- Foci
- Aberration, Chromatic
- Aberration, Spherical
- Spectroscopy
- Fluorescence
- Phosphorescence
- Zeeman Effect
- Mirage
- Fata Morgana

(b) *Optical Instruments:*

- Telescope
- Opera Glass

Field Glass
 Object-Glass
 Eyepiece
 Field of View
 Microscope
 Solar Microscope
 Camera Lucida
 Camera Obscura
 Aplanatic Lens
 Spectroscope
 Stereoscope
 Magic Lantern
 Moving Pictures
 Kinetoscope
 Dissolving Views
 Diaphragm
 Polariscope
 Nicol Prism
 Analyzer
 Polar Clock
 Kaleidoscope
 Chromatope
 Zoëtrope
 Fluoroscope
 Diaphanoscope
 Cyanometer
 Dioptrimeter
 Magic Mirror of Japan

(c) *Photographic Processes:*

Photography
 Photo-Chemistry
 Negative
 Ambrotype
 Daguerreotype Process
 Copying
 Color Photography
 Photo-Engraving
 Calotype Process
 Cyanotype Process
 Ferrottype
 Fothergill Process
 Photolithography (under Li-
 thography)
 Gelatin Process

6. MATTER AND MECHANICS.

Under this head, we may include a consideration of matter, including its general properties and the theories advanced to explain it, as well as the questions concerned with the motion of matter, and the methods and units employed to measure this motion. Considering the first subdivision, it is necessary to concern ourselves with the following titles:

Matter
 Vortex
 Molecules
 Inertia
 Porosity
 Ductility
 Elasticity
 Flexure
 Viscosity
 Gases, General Properties of
 Effusion
 Cohesion
 Adhesion

The science of mechanics deals with the motion of matter. After reading the fundamental article *MECHANICS*, the reader will be prepared to appreciate the associated articles as well as those dealing with the various stages of applied mechanics. Included in the former class, are the following:

Mechanics
 Dynamics
 Kinetics
 Kinematics
 Statics
 Moment
 Momentum
 Velocity
 Acceleration
 Force
 Potential

Central Forces

Couple

Energetics

Centre of Gravity

“ “ Gyration

“ “ Inertia

“ “ Oscillation

“ “ Percussion

“ “ Pressure

Aerostatics

Aerodynamics

Pneumatics

Hydrostatics

Hydrodynamics

Vortex

Waves

Stability

Impact

Gravitation

Falling Bodies

Vector

Capillarity

Mechanical Powers

Inclined Plane

Lever

Wheel and Axle

Pulley

Pendulum

Projectiles, Motion of

In order to measure motion and its effect, there are required systems of units, and these are usually arranged on such a basis that they are parts of a symmetrical system, such as the C. G. S. (Centimeter, Gramme, Second) system. This matter is fully explained in the following articles:

C. G. S.

Mechanical Units

Dimensions

Dyne

Erg

Foot-Pound

Joule

Watt

Kilowatt

Horse-Power

For the measurement and study of matter and its motion and other properties, numerous important pieces of physical apparatus have been devised. Thus, to measure the pressure of the atmosphere, or a gas, we have the **BAROMETER** and the **MANOMETER**. To remove the air from a vessel, the **AIR PUMP** is applied. For the linear measures, we have scales constructed with the **DIVIDING ENGINE** and compared with standards on the **COMPARATOR**. Instruments of such nature are included in the following list:

Air Pump

Barometer

Barometer, Water

Aneroid

Manometer

Magdeburg Hemispheres

Specific Gravity

Hydrometer

Jolly Balance

Balance

Spring Balance

Weighing Machine

Torsion Balance

Weights and Measures

Metric System

Dividing Engine

Comparator

Atwood's Machine

Barker's Mill

Hero's Fountain

7. MODERN THEORIES.

Modern Physics has many recent developments to record in the field of theory and many of the ideas once considered fixed and definite have been put to the test severely under later

conditions. Even GRAVITATION, whose laws were once considered fundamental, has been considered in the light of modern thought, while the recognition of the ELECTRON and the part played by IONIZATION has modified our original idea of ELECTRICITY and the ETHER. Furthermore, we have the new conception of RELATIVITY. Whatever the existence of matter and its explanation, yet when electrical oscillations take place or material bodies emit energy, or as it is termed, RADIATION, a wide range of phenomena is produced ranging from the Electromagnetic waves used in WIRELESS TELEGRAPHY and TELEPHONY to the waves of light. When the radiations are produced by the discharge of electricity through a vacuum we have the phenomena of the X-rays, while if the radiations are furnished spontaneously, as by such radioactive elements as RADIUM, THORIUM, etc., there are afforded the varied series of phenomena that would seem to indicate transformation of one element to another and bear an important relation to the theory and explanation of matter. Accordingly, in this connection, one could read with profit the articles on:

- Ether
- Gravitation
- Relativity
- Radiation
- Radiation Pressure
- Radium
- Radioactivity
- Electricity
- Light
- X-rays
- Waves

RADIOACTIVITY, by reason of its relation to theories of matter and the

involved phenomena, both physical and chemical, is now entitled to stand as a distinct Department of Physics, in so far as the physical phenomena are concerned.

The main article on this subject deals with the theories which have been advanced to explain the many interesting phenomena of the Radioactive substances. Accordingly one should read, in addition to this article, those on the various Radioactive elements, such as:

- Radium
- Uranium
- Actinium (particularly)
- Thorium
- Polonium

The biographies of the leading workers in this field, such as the Becquerels, Sir William Crookes, Professor and Madame Curie, Ernest Rutherford, Frederick Soddy and J. J. Thomson. and others referred to in the various articles. should also be read.

8. BIOGRAPHIES OF PHYSICISTS.

Some of the greatest achievements in that branch of science which is now known as Physics have been the work of philosophers who have also accomplished much in other fields, and consequently it is impossible, particularly in the case of ancient and mediæval scientists, to term them physicists, and include them in such a list. Also, in modern times, the work of the chemist, of the engineer, of the meteorologist, of the astronomer, and of other scientific workers, closely approaches or actually transgresses the limits which the physicist has set for himself. Therefore, the following list does not include all the principal workers, but a

certain number who primarily are distinguished for their work in physics.

Abney, W. de W.
Amici, G. B.
Amontons, G.
Ampère, A. M.
Arago, D. F.
Archimedes
Atwood, George
Bache, Alex. D.
Bacon, Roger
Becquerel, A. C.
Becquerel, A. E.
Becquerel, A. H.
Bell, A. G.
Biot, Jean B.
Boyle, Robert
Brewster, Sir D.
Bunsen, R. W.
Cailletet, L. P.
Carhart, H. S.
Carnot, N. L. S.
Cavendish, H.
Chladni, E. F. F.
Clausius, R. J. E.
Coulomb, C. A.
De la Rive, A. A.
Dollond, John
Dove, H. W.
Edison, T. A.
Ewing, J. A.
Fahrenheit, G. D.
Faraday, M.
Ferrari, G.
Fleming, J. A.
Forbes, J. D.
Foucault, J. B. L.
Fraunhofer, Joseph von
Fresnel, A. J.
Galvani, L.
Gauss, K. F.
Gay-Lussac, J. L.
Geissler, H.
Gilbert, W.

Glazebrook, R. T.
Gray, Elisha
Grove, Sir W. R.
Guericke, O. von
Haidinger, W. von
Halley, E.
Hauksbee, F.
Helmholtz, H. von
Henry, Joseph
Hero of Alexandria
Herschel, Sir W.
Hertz, H.
Hittorf, J. W.
Holtz, W.
Hopkinson, J.
Huygens, C.
Jenkin, H. C. F.
Jolly, P. von
Joule, J. P.
Kater, H.
Kirchhoff, G. R.
Kohlrausch, F.
Kundt, A.
Laplace, P. S. de
Leslie, Sir J.
Lodge, Sir O. J.
Magnus, H. G.
Malus, E. L.
Mariotte, E.
Mascart, E. E. N.
Maxwell, J. C.
Mayer, A. M.
Mayer, J. R. von
Mendenhall, T. C.
Michelson, A. A.
Morse, S. F. B.
Newton, Sir Isaac
Nichols, E. L.
Oersted, H. C.
Ohm, G. S.
Ostwald, W.
Papin, D.
Pictet, R.
Plateau, J. A. F.

- Pupin, M. I.
Quincke, G. H.
Rankine, W. J. M.
Rayleigh, J. W. S.
Réaumur, R. A. F. de
Regnault, H. V.
Roentgen, W. K.
Rowland, H. A.
Rühmkorff, H. D.
Sabine, Sir E.
Siemens, Sir W.
Somerville, Mary
Steinheil, K. A.
Stevin, S.
Stokes, Sir G. G.
Tait, P. G.
Tesla, N.
- Thompson, S. P.
Thomson, Sir J. J.
Thomson, William (Lord Kelvin)
Torricelli, E.
Trowbridge, J.
Tyndall, J.
Van't Hoff, J. H.
Violle, J.
Volta, A.
Watt, J.
Weber, W.
Wheatstone, Sir Charles
Wiedemann, G.
Wilde, H.
Woodward, R. S.
Wroblewski, Z. F.
Young, T.

Chapter 17. Aëronautics

IN only a very recent work of reference would it be possible to assemble a number of articles dealing with the modern theory and art of aërial navigation. Indeed, the practice of aëronautics has been so affected by the great War in Europe that the military and naval aspects of the matter have become predominant, and while the mechanical features are closely connected, yet the general reader at the present time is likely to be more concerned with the use of the aëroplane and dirigible in warfare.

In the NEW INTERNATIONAL ENCYCLOPÆDIA the student will find first a general article on AËRONAUTICS, in which the history of the evolution of the dirigible or airship from the balloon and of the aëroplane, from the earliest attempts at securing flight with a machine heavier than the displaced air, is traced. He will also find in the article on GASES, GENERAL PROPERTIES OF, the fundamental theory involved, and in the articles on MILITARY and NAVAL AËRONAUTICS the applications to warfare. In the section on *Aërial Operations*, in the long article on the WAR IN EUROPE, will be found a discussion of the use made of these machines in reconnaissance and combat.

The successful evolution of machines that could navigate air also has brought about legal problems and indicated changes both in international law and in other statutes or principles of law involved in the rules of the road and other obvious practices. Accordingly, a list of useful articles for one engaged in research in this field would be the following:

Aëronautics
Aërodynamics
Aërostatics
Military Aëronautics
Hangar
Navigation, Aërial, Law of
International Law

War in Europe (Section on Aërial
Operations)
Gases. General Properties of
Internal Combustion Motors
Military or Man-Raising Kite
Kite

Chapter 18. Chemistry

THE importance, for practically everybody, of acquiring a knowledge of chemistry hardly needs to be emphasized. Chemical facts and principles are involved, to a considerable extent, in every science and in every branch of industry, and chemical questions come up often in nearly every sphere of human activity.

In the *NEW INTERNATIONAL ENCYCLOPÆDIA* the science and applications of chemistry are treated in a large number of articles, many of which were written so as to serve a double purpose: first, to supply information on their special topics, without reference to chemical science as a whole, or to any other chemical topic; secondly, to form integral parts of an exposition of chemistry, for those who may desire to use the *Encyclopædia* for the acquisition of a general acquaintance with the subject. To serve the second purpose, they were written from a single viewpoint—on the whole, that of the German school of physical chemistry, now all but universally recognized as the best founded and most fruitful mode of viewing chemical phenomena. To serve the first purpose, which is all-important in a work of reference, each article (with few unavoidable exceptions), besides being written in simple terms, is supplied with all the information that is necessary to an understanding of the subject it treats, so that in most of the articles, no preliminary chemical knowledge is pre-supposed. But even in those articles in which the assumption of some preliminary knowledge could not, for obvious reasons, be avoided, no information was pre-supposed beyond what may be readily found in the *Encyclopædia* itself. Furthermore, in most of the articles the more essential information is concentrated in the opening paragraphs, the more technical and less essential in later parts of the article; so that glancing over the first paragraph alone may be sufficient for many purposes. If the end in view be the acquisition of some general knowledge of chemistry, the articles should be read entirely and carefully and the leading points briefly noted down, so as to afford, at any time of the reading, a clear retrospect over the ground covered.

For purposes of systematic reading, the chemical articles in the *Encyclopædia* may be grouped as follows: 1, Those dealing with general fundamental principles; 2, those dealing with the principal classes of carbon compounds; 3, those dealing with the theories of physical chemistry; 4, those articles, or sections of articles, dealing with the history of chemistry; 5, articles on the chemical elements; 6, articles on the principal compounds occurring in the living organism; 7, articles on other substances, inorganic and organic, presenting either theoretical or practical interest. In the following chapter devoted to *INTERNATIONAL CHEMISTRY*, as well as in the section on *Manufactures*, will be found listed and discussed the articles that deal with modern industrial processes and their products.

The order of this classification is the general reader, of principles and based on the relative importance, to facts. Should the course of syste-

matic reading be interrupted at some stage, a knowledge of at least some of the principles of chemistry ought to be much more valuable than a knowledge of some data concerning individual compounds, such as would be acquired if, following the usual order of chemical studies in schools, the course should be commenced by a perusal of the descriptive articles on the elements and their principal inorganic compounds.

1. FUNDAMENTAL PRINCIPLES AND PHENOMENA.

- Chemistry
- Analysis, Chemical
- Atomic Weights
- Avogadro's Rule
- Molecules
- Periodic Law
- Spectrum Analysis
- Reaction, Chemical
- Decomposition
- Dissociation
- Catalysis
- Nascent State
- Combustion
- Spontaneous Combustion

2. CARBON COMPOUNDS.

The compounds of carbon, numbering roughly 150,000, form the subject of organic chemistry, one of the most extensive and important branches of modern chemical science. In this branch the atomic and other theories have found a field for some of their most useful applications; and it is, therefore, advisable to acquire some knowledge of it at any early stage in chemical reading. The following is a list of the principal articles dealing with this branch; to be supplemented,

of course, on the practical side by those dealing with industrial processes as given in the following chapter:

- Carbon Compounds
- Stereo-Chemistry
- Alcohols
- Mercaptans
- Ethers
- Aldehydes
- Ketones
- Amines
- Amides
- Ureas
- Valence
- Carbohydrates
- Phenols
- Organo-Metallic Bodies
- Alkaloids

3. PHYSICAL CHEMISTRY.

Within recent years, physical chemistry has attained a degree of importance which makes some knowledge of it indispensable.

It is believed that this justified the introduction in the Encyclopædia of a somewhat extensive treatment of the subject. Following is a list of the principal articles, in the order in which it would seem advisable to read them:

- Avogadro's Rule
- Boiling-Point
- Freezing-Point
- Melting-Point
- Solution
- Dissociation
- Colloids
- Thermo-Chemistry
- Phase Rule
- Electro-Chemistry, General
- Photo-Chemistry
- Critical Point
- Evaporation

Distillation
Sublimation
Radioactivity

4. HISTORY OF CHEMISTRY.

The history of a great science, if studied after some knowledge of the principles and problems of the science has been acquired, has in itself a fascination for almost every mind. But, in the case of chemistry, many authorities have maintained that a knowledge of the history is not merely interesting, but absolutely indispensable to a thorough understanding of the science itself. In the *Encyclopædia*, a simple presentation of the development of chemical thought, and the gradual elimination of past errors of principle and method, will be found in the general article CHEMISTRY. Further historical information will be found in the article ALCHEMY, in the articles on physical chemistry, in those describing the elements and many chemical compounds, and especially in the biographies of celebrated chemists. Following is a list of some of the best-known names in the history of chemistry:

Helmont, J. B. van
Becher, J. J.
Stahl, G. E.
Black, J.
Priestley, J.
Cavendish, H.
Lavoisier, A. L.
Klaproth, M. H.
Dalton, J.
Wollaston, W. H.
Berzelius, J. J.
Davy, H.
Berthollet, C.
Avogadro, A.
Gay-Lussac, J. L.

Mitscherlich, E.
Liebig, J.
Wöhler, F.
Chevreul, M. E.
Dumas, J. B.
Laurent, A.
Gerhardt, K. F.
Gmelin, L.
Sainte-Claire Deville, H. E.
Cannizzaro, S.
Graham, T.
Kolbe, H.
Bunsen, R. W.
Roscoe, H. E.
Berthelot, P. E. M.
Wurtz, C. A.
Hofmann, A. W.
Regnault, H. V.
Pasteur, L.
Mendeléeff, D.
Schorlemmer, C.
Baeyer, A.
Fischer, E.
Van't Hoff, J. H.
Ostwald, W.
Nernst, W.
Arrhenius, S.
Curie, M. S. and P.
Crookes, W.
Ramsay, W.

5. THE CHEMICAL ELEMENTS.

The articles on the chemical elements will be found to contain descriptions, not only of the elements themselves, but also of their principal compounds, so that each article forms a chapter of inorganic chemistry. Following is a list of some of the principal articles in a recognized order of arrangement:

Hydrogen
Oxygen
Nitrogen
Carbon

Chlorine
Bromine
Iodine
Fluorine
Sodium
Potassium
Lithium
Magnesium
Calcium
Strontium
Barium
Zinc
Cadmium
Mercury
Boron
Aluminium
Silicon
Tin
Lead
Zirconium
Thorium
Phosphorus
Arsenic
Antimony
Bismuth
Sulphur
Selenium
Tellurium
Chromium
Molybdenum
Tungsten
Uranium
Manganese
Iron
Cobalt
Nickel
Platinum
Palladium
Copper
Silver
Gold

Articles on the rest of the elements, including the rare gases ARGON, HELIUM, NEON, KRYPTON, and XENON,

and of the radioactive elements, including RADIUM, POLONIUM, ACTINIUM, and THORIUM, will be found in their proper places. In connection with the radioactive elements, reference should be made to the article on RADIOACTIVITY. A list of the elements, with their chemical symbols and atomic weights, will be found in the article ATOMIC WEIGHTS.

6. COMPOUNDS OCCURRING IN LIVING ORGANISMS.

Physiological chemistry deals with the individual compounds forming the chemical ingredients of the materials of which living organisms and their products (*e. g.*, milk) are made up. A knowledge of the chemical and physical properties of those compounds is indispensable in the study of chemical physiology, and hence of physiology in general. The following is a list of the more important physiological compounds described under their names in the Encyclopædia:

Albumen
Allantoïn
Carbohydrates
Cellulose
Carnin
Casein
Cerebrin
Chitin
Cystin
Elastin
Fats
Fibrin
Gelatin
Globulins
Glycogen
Guanin
Hypoxanthin
Keratin

Kreatin
Kreatinin
Legumin
Leucin
Ossein
Proteins
Starch
Syntonin
Taurin
Urea
Uric Acid
Hæmatin
Hæmoglobin

Trimethylamine
Aniline
Pyridine
Quinoline
Alkaloids
Ptomaines

The article ALKALOIDS contains a list of the important members of this class of substances, with their principal characteristics. More extensive descriptions are given in the special articles on all the more important alkaloids.

7. OTHER IMPORTANT ARTICLES ON
CHEMICAL SUBJECTS.

(a) *Metallic Alloys:*

Alloy
Amalgam
Babbitt Metal
Brass
Britannia Metal
Bronze
Fusible Metal
German Silver
Phosphor-Bronze
Pewter
Pinchbeck
Platiniridium
Spence's Metal

(b) *Bases:*

The inorganic bases, *i. e.*, metallic oxides and hydroxides, are mostly described in connection with the metallic elements. Important special articles are:

Ammonia
Lime
Soda

The articles on organic bases include:

Amines
Ethylamine

(c) *Acids:*

All the more important acids are described in special articles under their names. Many acids of secondary importance are mentioned in connection with their characteristic elements. Following is a partial list of important articles on acids:

i. General:

Acids
Phenols

ii. Inorganic:

Sulphuric Acid
Hydrochloric Acid
Nitric Acid
Sulphureted Hydroger
Phosphoric Acid
Hydrobromic Acid
Hydriodic Acid
Hydrofluoric Acid
Chloric Acid
Perchloric Acid
Hypochlorous Acid
Nitrous Acid
Hyponitrous Acid
Phosphorous Acid
Hypophosphorous Acid
Manganic and Permanganic
Acids

iii. Organic:

Acetic Acid
 Benzoic Acid
 Butyric Acid
 Caproic, Caprylic, and Capric
 Acids
 Carboic Acid
 Carbonic-Acid Gas
 Cinnamic Acid
 Citric Acid
 Cyanic Acid
 Cyanuric Acid
 Formic Acid
 Fumaric and Maleic Acids
 Gallic Acid
 Glycin
 Hippuric Acid
 Hydrocyanic Acid
 Hydroferricyanic Acid
 Hydroferrocyanic Acid
 Lactic Acid
 Lauric Acid
 Malic Acid
 Margaric Acid
 Meconic Acid
 Myristic Acid
 Cœnanthyllic Acid
 Oleic Acid
 Oxalic Acid
 Palmitic Acid
 Picric Acid
 Stearic Acid
 Succinic Acid
 Tannic Acid
 Tartaric Acid
 Uric Acid
 Valeric Acid

An important "homologous series" of acids, included in this list, is constituted by the following so-called "fatty acids":

Formic
 Acetic

Butyric
 Valeric
 Caproic
 Caprylic
 Capric
 Senanthyllic
 Lauric
 Myristic
 Palmitic
 Margaric
 Stearic

Allied to the last-named is Oleic Acid.

The acid anhydrides are mostly mentioned in connection with the metalloid elements.

(d) *Salts*:

Salts are mostly described in connection with either the acids or the bases combined in them. The following are a few special articles on salts:

Alum
 Borax
 Cream of Tartar
 Epsom Salt
 Glauber's Salt
 Iodides
 Rochelle Salt
 Ichthyol
 Saltpetre
 Soda

Bases, acids, and salts constitute together the so-called "electrolytes." Their peculiar behavior in aqueous solutions has led to the formulation of the now well-known theory of electrolytic dissociation, which may be found treated in the articles SOLUTION, DISSOCIATION, and ACIDS.

(e) *Hydrocarbons*:

Hydrocarbons
 Methane

Ethane
Propane
Butane and Isobutane
Ethylene
Acetylene
Benzene
Naphthalene
Anthracene

Further information concerning hydrocarbons may be found in articles on such products as oils (volatile), paraffin, ozokerite, petroleum, benzine, rubber, gutta-percha, gas (illuminating and natural), etc.

(f) *Other important compounds:*

Water
Hydrogen Dioxide
Ozone
Alcohol
Methyl Alcohol
Glycerin
Mannite
Aldehyde
Chloral
Acetone
Almonds, Volatile Oil of
Acrolein
Acetone
Ether
Chloroform
Iodoform
Nitro-Benzene
Carbides
Calcium Carbide
Carbon Disulphide
Carbonic Oxide
Cyanogen

(g) *Pigments, Dyestuffs, and Allied Subjects:*

Paints
Mineral Colors
Vegetable Colors

Dyeing
Mordants
Coal-Tar Colors
Tar
Coal Tar
Indigo
Alizarin
Purpurin
Aurin
Rosolic Acid
Archil
Arnotto
Carmine
Cochineal
Flavin
Fustic
Henna
Indian Yellow
Lac Dye (under Lac)
Litmus
Madder
Orcin
Orcein
Logwood
Murexid
Phenicin
Quercitron
Green
Brunswick Green
Turkey Red
Cinnabar
Blue
Indigo
Lampblack
White Lead

A list of the widely used coal-tar colors ("aniline dye-stuffs"), with their principal characteristics, will be found in the article COAL-TAR COLORS.

(h) *Waxes, Fats, Oils, and Soap:*

Waxes
Beeswax
Spermaceti

Fats
 Palmitin
 Stearin
 Olein
 Oils
 Almonds, Expressed Oil of
 Almonds, Volatile Oil of
 Canada Balsam
 Castor Oil
 Cod-Liver Oil
 Croton Oil
 Garlic, Oil of
 Grass-Oil
 Gurjun Balsam
 Lemon Oil
 Menthol
 Petroleum
 Turpentine
 Wintergreen, Oil of
 Soap

All the typical waxes and oils are described in the general articles under these names. Paraffin, which is sometimes spoken of as "paraffin wax," is described in an article under its own name.

(i) *Gums and Resins:*

Gums
 Resins
 Amber
 Ammoniac
 Anime
 Arabin
 Copal
 Bassora Gum
 Bdellium
 Catechu
 Dragon's Blood
 Gambir
 Gamboge
 Gum Arabic (under Gums)
 Kino
 Mucilage

Olibanum
 Podophyllin
 Rosin
 Sandarac
 Scammony

Camphor, which is sometimes spoken of as "gum camphor," is described under its own name. "British gum," a substitute for gum arabic, is described under DEXTRIN.

(j) *Explosives:*

The chemistry of EXPLOSIVES, both those employed for military purposes and in mining and other industries, represents a field in which the theoretical and technological advances have been extraordinary, and the new compounds that the chemist has invented have played their part in peace and war. In no department of chemistry have there been more interesting developments than in the theory of Explosives and the various groups into which modern Explosives are classified all present interesting theoretical considerations for the chemist.

Accordingly, the student interested in the history, classification and theory of Explosives, and wishing to learn of the various explosive mixtures, of the nitrates, of the chlorates and perchlorates, and compounds derived by nitro-substitution, and those compounds known as nitro-derivatives, as well as smokeless powders, nitro-glycerin, fulminates and amides, should read the article on EXPLOSIVES, which not only discusses theory, but the growth of the industry in the United States and the use of Explosives in industry, such as for blasting and mining, and the regulations attending their transportation and stor-

age. Of course, the older forms of Explosives are discussed under gunpowder, while GUNCOTTON, NITRO-GLYCERIN and NITRO-CELLULOSE show the application of these substances to this branch of chemistry. *Dynamite* is typical of the articles on high power explosives, while the article on TRINITROTOLUENES describes one of the latest of the powerful military explosives.

An appropriate list for careful reading in this department would be as follows:

- Dualine
- Dynamite
- Extralite
- Explosives
- Emmensite
- Nitroglycerin

- Guncotton
- Gunpowder
- Melinite
- Lyddite
- Magazine
- Nitrocellulose
- Pyroxylin
- Stemming
- Trinitrotoluenes

(k) *Waters:*

- Water
- Ice
- Distilled Water
- Aërated Waters
- Carbonated or Acidulous Waters
- Chalybeate Waters
- Mineral Waters
- Selters Water
- Apollinaris Water

Many of the foregoing articles are concerned either with theory or with the nature and composition of various chemical elements or substances, apart from their uses in the arts, where the labors of modern research chemists have found wide and useful application. Accordingly, the following chapter on INDUSTRIAL CHEMISTRY will take up some of the more important substances and processes that enter into modern technology.

Chapter 19. Industrial Chemistry

HAVING mastered the underlying principles and more important facts of chemistry, such as the nature of the various elements, the conditions under which they exist and the laws under which they combine, and the most generally and commonly employed chemical substances, the reader interested in the practical applications of this vast field of theoretical science naturally will desire information as to the extent to which scientific chemistry figures in the arts, and some description of the various technological processes involved in wholesale production. Methods of manufacture representing theory reduced to practice often involve the results of the most refined research and scientific investigation, by which everyday materials are produced for general use and the benefit of mankind. Vast industries involving both inorganic and organic chemistry have been built up on the labors of the scientist, and as trade follows the flag so manufacturing prosperity follows and in large measure depends on the labors of the industrial chemist.

The reader of this department in *THE NEW INTERNATIONAL ENCYCLOPEDIA*, who first has studied the leading articles of the last chapter, probably would be best served by taking up first the articles dealing with the various processes of industrial chemistry, noting especially how the methods of the factory differ from those of the laboratory.

Leading articles in this field would be:

Lixiviation
Evaporation
Distillation
Sublimation
Filter and Filtration
Filter Press
Bleaching
Calcining
Refrigeration
Roasting
Electro-Chemistry

FUEL.

Then, as heat plays an important part in all industry, chemical and other, a study of fuels would be next in order. Fundamentally and generally these are discussed in the article on *FUEL*. There are articles on the various solid and liquid fuels to which reference should be made for the im-

portant by-products involved, as in the case of the coal-tar colors, ammonia, hydrocarbons and other substances from the coal gas plants and coke ovens. These represent quite an important field of chemistry. Therefore, it may be suggested that the articles be taken up as follows:

Solid Fuels:

Charcoal
Coal
Anthracite
Bituminous Coal
Tar
Lignite
Coal Tar
Coke
Peat

Liquid Fuels:

Alcohol

Petroleum

Kerosene

Oil

Gaseous Fuels:

Gas, Illuminating and Fuel

Acetylene

Calcium Carbide

Gas Engine

Internal Combustion Engine

Motor Vehicle

WATER.

The Industrial Chemist after fuel is next concerned with Water. It may be hard or soft, saline or alkaline, suitable or unsuitable for use in a boiler, or having special properties making it desirable in the manufacture of such beverages as beer and ale. Its purification may require a wide range of special processes ranging from chlorination to distillation. Accordingly, a suitable line of reading would be somewhat as follows:

Water

Water Supply

Water Purification

Water Works

Distillation

Filter and Filtration

Boiler

Boiling Point

Mineral Waters

Bottling

COMMON CHEMICALS.

In Industrial Chemistry there are a number of rather common chemicals, but with a vast economic importance, for they enter so largely into manufacturing that they are always in constant demand and use. A few of these groups may be studied at some length. Thus—Sulphur, whose mining, extrac-

tion and purification are all problems in chemical engineering, has a number of important compounds, of which the best known industrially are found in the accompanying list:

Sulphur

Sulphureted Hydrogen

Sulphuric Acid

Sulphurous Acid

Thiosulphuric Acid

Found widely in nature, SALT is an important substance and common salt or Sodium Chloride is used not only for food, but in the manufacture of Soda Ash, Sodium Carbonate, and other substances. Consequently, the articles

Sodium

Salt

Soda

should be read, it being noted that under these a number of Sodium compounds are treated.

The Chlorine industry involves the preparation of substances used extensively in the arts as a bleaching or oxidizing agent, and the liquid chlorine in addition has been employed extensively as an asphyxiant in the great European War. See:

Chlorine

Chloric Acid

Chlorites

Chlorimetry

Hydrochloric Acid

Hypochlorous Acid

Sal Ammoniac

Mercuric Chloride

Mercurous Chloride

Bleaching Powder

Chloridizing

Chlorination

The various compounds of calcium supply to the arts a large number of important materials, including **MARBLE** and other **BUILDING STONES**, **LIME-STONE** for iron and lead smelting, **GYPHUM OF PLASTER OF PARIS** (Lime Sulphate), **CEMENT**, in which Lime is the principal ingredient, **BLEACHING POWDER** or **CHLORIDE OF LIME**, **MORTAR**, in which Lime enters largely, and so on through an extensive list. In practically all of these purposes there is work for the industrial chemist, whether it involves the calcining of the material in a kiln to form cement or the study of concrete, now used so largely for structural work. Consequently, the reader who follows through the various articles on Calcium and its compounds as given below will realize their industrial importance:

Lime
Limestone
Marble
Building Stone
Marl
Chalk
Calcite
Iceland Spar
Gypsum (Lime Sulphate)
Bleaching Powder (Lime Chloride)
Cement
Kiln
Mortar
Concrete
Masonry
Plaster of Paris
Plaster, Lathing and Plastering
Calcium Carbide
Fertilizers
Manures and Manuring
Iron and Steel, Metallurgy of
The Destructive Distillation of wood

affords a number of important products, among which is acetic acid, largely used in the manufacture of acetates. There are also a number of other or related substances, so that if we examine a rather broad group we find a number of valuable materials included. These may be embraced in the following list:

Distillation
Acetic Acid
Acetine
Methyl Alcohol
Tar

The Destructive Distillation and other treatment of bones also affords useful chemical products. The use of bone products as fertilizers, the employment of bone black as a decolorizing agent in filtration, as in sugar refining, are specially important. The connection tissue in skin and bones is used in making gelatine, and the bones themselves are employed in making glue. Accordingly, if the articles enumerated below be consulted a substantial idea of this field of chemical technology will be gained:

Bone
Bone Black
Bone Fertilizers
Gelatin
Glue

The industrial chemist has important work in connection with the manufacture of various artificial fertilizers which modern intensive agriculture demands. Naturally, this branch is closely connected with scientific agriculture and agricultural chemistry. Consequently, one will find in the accompanying list of articles much that will indicate how the chemist is assist-

ing the processes of nature. Such articles would be :

Manures and Manuring
Bone Fertilizers
Peat
Ashes
Phosphate
Potash
Kelp
Cyanamid

INORGANIC INDUSTRIES.

In Industrial Chemistry the great division of inorganic and organic chemistry can be observed in considering the products of various industries. A certain number containing various groups have been entered specifically on these lists, but the main topics involved can be indicated together and then the reader can pursue his investigations further, depending both on the list in this Guide and on the elaborate cross references given with the articles. Under Inorganic Chemistry reference profitably can be made to the following main and more prominent articles :

Sulphur
Sulphuric Acid
Salt
Hydrochloric Acid
Soda
Sodium
Chlorine
Nitric Acid
Ammonia
Potash
Bromide
Iodine
Phosphorous
Boric Acid
Arsenic
Oxygen

Peroxides
Sulphates
Alum
Cyanides
Carbon
Carbon Disulphide
Carbon Monoxide

MINERAL COLORS.

An important series of industries in Inorganic Chemistry involve the manufacture of pigments. The various chemicals entering into the more important of the pigments are discussed largely under MINERAL COLORS and separately as follows :

White :

White Lead
White Chalk
Lithopone
Gypsum
China Clay

Blue :

Ultramarine
Smaltite
Copper Indigo

Green :

Ultramarine
Brunswick Green
Chrome Green
Malachite Green
Verdigris
Paris Green

Yellow :

Chrome Yellows
Cadmium
Litharge
Gamboge
Indian Yellow or Purree

Orange :

Chrome Orange

Red:

Red Lead
 Chrome Red
 Red Ochre
 Vermilion
 Realgar
 Antimony Red
 Carmine

Brown:

Umber
 Sepia

Black:

Lampblack
 Bone Black
 Charcoal
 Graphite

ORGANIC INDUSTRIES.

Industrial Chemistry is so closely connected with manufacturing and manufacturing processes that in any classification such as could be observed in an encyclopædia, it is very difficult to draw any satisfactory line of demarkation. Particularly is this the case in the large number of industries where organic chemistry plays an important part and underlies the various processes of manufacture.

Accordingly, the reader should refer to the chapter on MANUFACTURES AND ENGINEERING, where, under these various industries and products often the chemical technology is discussed. Such a list of organic industries would be as follows:

Distillation
 Gas, Illuminating and Fuel
 Coal Tar
 Coal-Tar Colors
 Mineral Oils

Petroleum

Waxes
 Fats
 Oils
 Soap
 Candle
 Glycerine
 Gums
 Resins
 Starch
 Dextrin
 Glucose
 Sugar
 Fermentation
 Distilled Liquors
 Beer
 Brewing
 Explosives
 Fibres
 Dyeing
 Paper
 Leather
 Glue

MINERAL OILS.

The preparation and refining of Mineral Oils has produced a wealth of materials aside from the fuel oils proper, and one interested in this field after reading the comprehensive discussion on PETROLEUM will turn to other articles dealing with allied topics, as contained in the accompanying list:

Petroleum
 Naphtha
 Paraffin
 Petrolatum
 Vaseline
 Shale Oil
 Ozokerite
 Mineral Tallow
 Asphalt

Chapter 20. Home Economics and Domestic Science

IT is but natural that the modern tendency to secure increased efficiency and, consequently, increased comfort and convenience should be manifested in the home through the application of scientific management and devices no less than in commerce and industry. In its latest aspects this finds full expression in the NEW INTERNATIONAL ENCYCLOPÆDIA.

Modern science has done much for the housekeeper, securing more nourishing and more economical foods, as well as as various labor-saving devices—such as SEWING MACHINES and VACUUM CLEANERS—that materially cut down the effort necessary to maintain and operate a domestic establishment. This concerns the small as well as the large householder, for electric light, gas heating and plumbing are all but universally found, and economic methods have been devised for the small city apartment or the isolated farm whereby the maximum well-being, comfort and economies generally can be obtained.

Modern *home economics* is not concerned alone with Food and its Preparation. The intelligent woman of to-day, managing a home, often arranges for its building, for the carpentry, heating, plumbing, wall paper, furniture and carpets and rugs, or for its lease if a rented dwelling, or a portion of an apartment house or hotel. If sufficiently large, the dwelling may involve electric heating, including electric cooking, vacuum cleaners or laundry machines, and in many of the modern homes may involve an organization as complex as a small business, and this involves a number of employees—male and female—to whom the principles of Master and Servant must apply. In a large part, however, Domestic Science has to do with food and its preparation, for it is here that the chemistry of nutrition has been brought to bear, and the wholesome and economical preparation of food is one of the main objects of the modern science of Household Chemistry.

Considering, therefore, the articles already suggested and others arranged in a convenient list for ready reference, we should have first the following, dealing with the home and its material equipment:

House
Apartment House
Tenement House
Hotel
Building
Carpentry
Heating and Ventilation
Plumbing
Electric Heater
Electric Lighting
Lighting

Illumination
Vacuum Cleaner
Water Supply
Filter and Filtration
Laundry Machinery
Sewage Disposal

On the legal side, the householder should know something of the law dealing with such subjects as:

Deed

Title

Lease

Master and Servant

Supplied with a proper house and concerned with its management or with the management of an institution where features of home life and home conveniences must apply, one would be concerned with the articles on

Home Economics

Management, Home and Institution
Coöperation

Marketing Associations, Agricultural

It is, however, on food and food supply that intelligent interest centers, for it is here that the high cost of living first makes itself apparent, not to mention that the appetite may prove the shortest road to a man's well being if not to his mind. One concerned with modern scientific food studies realizes that chemistry and physiology figure actively, so that a range of articles are available that are indeed comprehensive.

Food

Fish as Food

Diet

Digestion

Nutrition

Infants, Feeding of

Cookery

Baking

Sterilized Food

Packing Industry

Slaughterhouse

Adulteration

Pure-Food Law

Prepared by the preceding rather general articles on Foods and Food-Stuff, the reader in this department will be ready to take up specifically a number of classes of Foods, or, in some cases, definite food substances. Such a list would include the grains and their products:

Barley

Buckwheat

Rye

Wheat

Maize

Rice

Flour

Bread

There would also be such important foods as

Milk

Cream

Butter

Butter Color

Butter Making

Oleomargarine

Cheese

Eggs

Meat

Meat Extract

Chapter 21. Interior Decoration and Decorative Art

WITHIN a few years there has developed in connection with, yet at the same time apart from, architecture and the fine arts increased interest in those æsthetic forms of expression that are found in the home or dwelling. While always recognized on its artistic side, home decoration has now become a practical art requiring systematic training on the part of those by whom it is practised, and having secured for itself general public recognition as distinct from architecture or mere trade activity in the supply of the articles necessary for the home.

With the growth of civilization the decoration of the home, be it a hut, cave, cottage, or palace, has always appealed directly to its owner or occupants, and their taste has found expression in combining beauty with utility. As a result there is to be seen decorative activity ranging from a most humble scale to securing the work of the greatest artists of the period for ornamental purposes. It is only recently that the proper and most advantageous uses of articles of decorative value have been recognized, and with the growth of luxury and comfort there has been, on the whole, a corresponding growth in good taste. In large part, this has been due either to artist, craftsmen of rare talents or to those who have studied the various æsthetic elements involved in house decoration, recognizing the cardinal principle that a home is designed for habitability. From such study encouraged by museums and collections there has grown up a school of decorative art known as interior decoration, which aims to cultivate public taste to appreciate the artistic and to make the home conform to the accepted canons of good taste, where the work not only of artists but of skilful craftsmen and artisans will be appreciated.

This movement involves both a general manifestation of progressively better taste and the activities of those trained professionally in schools of fine arts or design to practice the art of interior decoration and to advise persons who need such assistance. Just as the ordinary person requires the service of an architect to design or remodel a house or apartment, so when its decoration and furnishing are involved there is no less a call for the services of a trained interior decorator, rather than a mere painter, upholsterer or tradesman. To this profession many women, as well as men, are now devoting themselves with marked success, and to learn of their training and their work one can turn to the article on INTERIOR DECORATION. Here will be found, also, a broad view of the development and scope of the modern art, and if read in connection with the more formal article on DECORATIVE ART, with attention also to ORNAMENT and ARCHITECTURE, a good idea will be gained of the modern status of this important field. Naturally, there are subsidiary to it a number of subordinate articles—thus, FURNITURE is an important part of Interior Decoration, and in its development may be traced the

196 INTERIOR DECORATION AND DECORATIVE ART

general progress of the beautiful with the practical, though retrogression in taste unquestionably is to be noted with the increase of mechanical facility in production and otherwise. Likewise, in CARPETS and RUGS decorative impulse finds expression, and floor coverings represent a wide diversity of artistic ideas, depending upon their service, from the hand looms of the Orient to the modern carpet factory. Again, in the decoration of the surfaces of walls from the older tapestries to the WALL PAPER of the day, a distinct artistic development is represented. In TEXTILE PRINTING also modern art has brought about a wide range of decorative material for the modest householder.

Therefore, with the citation of such main titles, a consideration of a somewhat fuller list will show the interrelation of the articles in this and allied departments, and how advantageously they fit into a comprehensive reading scheme. The list might be taken up in the following order:

Interior Decoration	Veneer
Decorative Art	Wall Paper
Ornament	Paper Hanging
Architecture	Textile Printing
Mural Decoration	Tapestry
Painting	Gobelin
Sculpture	Carpet
Illumination	Rug
Furniture	Lamp
Chippendale Chairs	Lacquer Work
Chippendale, Thomas	Pottery
Hepplewhite, George	Armor
Sheraton, Thomas	Metal Work
Boulle	

Chapter 22. Geology

GEOLGY covers a broad field. Its primary object is to explain the origin and development of the earth and the inhabiting life forms. It is concerned thus on the one side with inorganic nature—the character of the materials which constitute the earth's structure, the formation and classification of rocks, the forces of uplift that have produced mountains and continental lands, the agencies that work to modify surface features, the phenomena of earthquakes and volcanoes, and all processes of change operative from the beginning; in another aspect it is allied to the biologic sciences for which it endeavors to find an explanation for the present distribution of plants and animals in the evidences afforded by fossils which have been preserved in the superficial layers of the earth.

Because of its wide scope, geological science has been separated into a number of departments, each with its distinct formations, but none the less closely related to all the others. Of fundamental importance is Petrology, the branch which considers the nature of rocks and the methods of their origin. This branch is one of the last to have attained a real scientific basis. The arrangement of the rocks as they appear at the surface—often quite different from their original attitudes—and the significance of the arrangement in relation to past events, constitute the subject matter of Structural Geology. The great changes which have taken place and are still in progress belong to the field of Dynamical Geology, which considers the action of the atmosphere, water, igneous activity and crustal strains in modifying the earth's features. Its study is essential to the proper understanding of physical geography, particularly the modern development of that subject known as physiography. Consequently the references to physiographic articles will be included under its head. Stratigraphical Geology has for its particular province the investigations of the order and chronological classification of the strata and the study of the geography of the earth in past ages. It has a valuable adjunct in Paleontology, which is the study of fossils and their interpretation in the light of evolution. Geology has many practical bearings, and its application to mining, agriculture and engineering is considered under the head of Economic Geology.

We shall now guide the reader to the articles relating to those several divisions of the subject. For the general article, see GEOLOGY.

A. Petrology

For the more comprehensive articles in this field, see:

Petrology
Mineralogy

Crystallography
Rock

The various large groups or classes of rocks are described under the following titles:

Igneous Rocks
 Aqueous Rocks
 Æolian Accumulations
 Clastic Rocks
 Plutonic Rocks
 Metamorphic Rocks
 Crystalline Rocks
 Arenaceous Rocks
 Argillaceous Rocks
 Calcareous Rocks

For the more important specific kinds of rocks, see:

1. IGNEOUS (MASSIVE) ROCKS:

Granite
 Rhyolite
 Porphyry
 Syenite
 Trachyte
 Phonolite
 Diorite
 Dacite
 Felsite
 Gabbro
 Pyroxenite
 Hornblendite
 Peridotite
 Diabase
 Basalt
 Melaphyre
 Felsite
 Trap
 Obsidian
 Pitchstone
 Lava
 Tuff

2. SEDIMENTARY (STRATIFIED) ROCKS.

(a) *Mechanical Sediments:*

Sand
 Gravel
 Sandstone

Conglomerate
 Breccia
 Clay
 Shale
 Silt
 Loess
 Boulder Clay
 Drift

(b) *Chemical Sediments:*

Limestone
 Dolomite
 Travertine
 Gypsum
 Salt
 Geyserite
 Bog-Iron Ore
 Clay Ironstone

(c) *Organic Sediments:*

Limestone
 Coquina
 Chalk
 Coral
 Marl
 Diatomaceous Earth
 Phosphate Rock
 Peat
 Lignite
 Coal

3. METAMORPHIC (FOLIATED) ROCKS:

Marble
 Quartzite
 Slate
 Schist
 Gneiss
 Amphibolite
 Mica Schist
 Eclogite
 Serpentine
 Talc
 Soapstone
 Chlorite Schist

B. Structural Geology

The broader features of geological structure are described in the articles:

Bed
Formation
Conformity
Unconformity
Laccolite
Batholite
Boss
Dike
Sill
Veins

The smaller elements of structure which pertain to the above larger forms are explained in the articles:

Joints

Foliation
Lamination
Schistosity
Stratification

The effects of uplift and disturbance upon rocks are described in the articles:

Continent
Mountain
Anticline
Syncline
Monocline
Dip
Strike
Fault
Clinometer

C. Dynamic Geology and Physiography

The general subject of dynamic agencies operative within the earth is discussed in the articles:

Crust of the Earth
Elevation and Subsidence
Metamorphism
Cataclysm
Volcano
Earthquake
Geyser
Refrigeration of the Earth

For the evolution of the topography of the earth's surface, see:

Physiography
Erosion
Continent
Island
River
Valley
Plateau
Lake
Glacier
Glacial Period

D. Stratigraphical Geology

The rocks composing the outer solid structure of the earth are separated according to their position and relative age into large divisions which are

designated as groups. Each group represents a long interval of time or era during which the strata were accumulated. The different groups and

their corresponding eras are described under:

Archeozoic Era
 Proterozoic Era
 Paleozoic
 Mesozoic Era
 Cenozoic

These main divisions are further subdivided into systems, or, according to the time element, into periods. The several systems are described in the following articles:

1. *Archeozoic and Proterozoic:*

Pre-Cambrian Formations

2. *Paleozoic:*

Cambrian System
 Ordovician
 Silurian System
 Devonian System
 Carboniferous System
 Permian System

3. *Mesozoic:*

Triassic System
 Jurassic System
 Cretaceous System

4. *Cenozoic:*

Tertiary System
 Quaternary System

The broader scheme of classification as outlined above is of general application. Further subdivision becomes necessary in the study of particular areas, for the individual strata change in character and often in fossil content, as they are traced from place to place. To identify the minor units, geologists usually employ local names

which have currency only within a single country or among such countries as have very similar stratigraphic development. Some of the more important minor divisions in the United States are described in the articles:

Pre-Cambrian:

Keweenaw Series

Cambrian:

Potsdam Sandstone

Ordovician:

Calciferous
 Trenton
 Hudson River Beds

Silurian:

Medina Series
 Clinton Stage
 Niagara Series
 Salina Stage

Devonian:

Oriskany
 Lower Helderberg
 Chemung Formation
 Catskill Formation

Carboniferous:

Millstone Grit
 Pottsville Conglomerate
 Burlington Limestone

Triassic:

Newark Series

Jurassic:

Liassic
 Oolite

Cretaceous:

Potomac Formation
 Dakota Stage
 Niobrara Stage
 Laramie Stage

Tertiary:

Eocene Epoch
 Oligocene Epoch
 Miocene Epoch
 Pliocene Epoch

Quaternary:

Columbia Series
 Drift
 Glacial Period
 Recent Period

E. Paleontological Geology

Paleontology is the study of the nature and distribution of the life forms imbedded in the rocks of the earth's crust. Viewed from the standpoint of biological science, it is a part of zoology and botany; but it is so intimately connected with the study of the rocks themselves that it may properly be considered a part of geology. The general articles on the subject are:

Paleontology
 Paleobotany
 Fossil
 Fossiliferous Rocks
 Contemporaneity
 Homotaxy
 Ichnology
 Fossil Forests

From a biological point of view, the proper method of classifying fossil forms would naturally follow the same principles that guide the classification of living plants and animals. But in studying paleontology as a part of geology, the geological classification is preferable; indeed, the two systems would, to a certain extent, coincide. We shall, therefore, refer the reader to the characteristic fossils of each geological epoch. Most of the larger classes and orders of fossil forms are still represented by living species, and general discussions of these classes

will be found in the articles given in the chapters on Botany and Zoology.

1. The only fossils found in the Pre-Cambrian Formation are described in the article **ANTIQUOKANIA**:

2. CAMBRIAN FOSSILS:

(a) *Plants*:

Oldhamia

(b) *Animals*:

Protospongia
 Dictyonema
 Agnostus
 Paradoxides
 Dikellocephalus
 Olenellus
 Trilobita
 Lingula
 Obolella
 Hyolithes
 Nautiloidea

3. ORDOVICIAN AND SILURIAN FOSSILS:

(a) *Invertebrates*:

Brachiospongia
 Stromatopora
 Graptolite
 Monograptus
 Favosites
 Olenus
 Chonetes
 Asaphus
 Polyzoa

Fenestella
 Atrypa
 Orthis
 Spirifer
 Pentamerus
 Bellerophon
 Pteropoda
 Orthoceras
 Tentaculites
 Eurypterus

(b) *Fishes*:

Pteraspis
 Cyathaspis

4. DEVONIAN FOSSILS:

(a) *Invertebrates*:

Atrypa
 Cyathophyllum
 Phacops
 Ammonoidea
 Pleurotomaria
 Murchisonia
 Clymenia
 Goniatites
 Bactrites
 Heliophyllum

(b) *Fishes*:

Holoptychius
 Osteolepis
 Dipterus
 Coccosteus
 Dinichthys
 Cephalaspis
 Chirolepis

5. CARBONIFEROUS FOSSILS:

(a) *Plants*:

Neuropteris
 Calamites
 Asterophyllites
 Annularia

Lepidodendron
 Sigillaria
 Stigmaria
 Cordaites
 Carpolith
 Trigonocarpus

(b) *Invertebrates*:

Fusulina
 Chonetes
 Productus
 Proetus
 Eurypterus

(c) *Fishes*:

Megalichthys
 Cestraciont

(d) *Reptiles*:

Stegocephalia

6. PERMIAN FOSSILS:

(a) *Fishes*:

Palæoniscus

(b) *Reptiles*:

Rhynchocephalia

7. TRIASSIC FOSSILS:

(a) *Plants*:

Equisetum
 Cycadaceæ

(b) *Invertebrates*:

Terebratula
 Ceratites
 Ammonites

(c) *Reptiles*:

Mastodonsaurus
 Theromorpha
 Dinosauria
 Anchisaurus
 Labyrinthodon
 Dicynodon

(d) Mammals:

Microlestes

Microconodon

Iguanodon

Mosasauria

Elasmosaurus

Hadrosaurus

8. JURASSIC FOSSILS:

(a) Invertebrates:

Gryphæa

Trigonia

Belemnites

(c) Birds:

Bird, Fossil

Hesperornis

Ichthyornis

(b) Fishes:

Chondrosteus

Hybodus

10. EOCENE FOSSILS:

(a) Invertebrates:

Nummulites

(c) Reptiles:

Teleosaurus

Ichthyosaurus

Plesiosaurus

Pterodactyl

Dimorphodon

Diplodocus

Megalosaurus

Brontosaurus

Stegosaurus

Titanosaurus

Cynognathus

Baptanodon

Camptosaurus

Ceratosaurus

(b) Reptiles:

Zeuglodon

(c) Mammals:

Coryphodon

Hyracotherium

Horse, Fossil

Palæotherium

Anchitherium

Anoplotherium

Lophiodon

Creodonta

(d) Birds:

Archæopteryx

(e) Mammals:

Ctenacodon

9. CRETACEOUS FOSSILS:

(a) Invertebrates:

Foraminifera

Globigerina

Ventriculites

Hippurites

Radiolites

Inoceramus

(b) Reptiles:

Chelonia

11. MIOCENE FOSSILS:

(a) Mammals:

Mastodon

Dinotherium

Helladotherium

Machærodus

Elotherium

Halitherium

Hyracodon

Oreodon

Titanotherium

12. PLIOCENE FOSSILS:

(a) Plant:

Dæmonelix

(b) Mammals:

Sivatherium

Hipparion
Sabre-Toothed Tiger

13. QUATERNARY FOSSILS:

(a) *Birds*:

Æpyornis
Moa

(b) *Mammals*:

Elasmotherium
Megatherium
Glyptodon
Diprotodon
Mammoth
Mastodon
Pithecanthropus

F. Economic Geology

This department considers the application of geological facts and principles to industry and technology. The service of geology to mining is especially important and has been recognized very generally by the organization of public surveys to furnish information about the occurrence and distribution of the mineral resources. With this function is usually combined the study of underground waters, a branch that has gained prominence quite recently through the development of the arid tracts of the western United States. Geology also affords useful guidance in the conduct of engineering construction, and of course is the basis for the investigation of the formation and distribution of soils.

The mineral materials that find employment in the arts or industry are of great variety and exhibit wide differences in their methods of occurrence. Some are used in the form in which they exist in nature, or require only a mechanical process of purification or preparation. Such are exemplified by building stones and coal. A large class of minerals, however, have no value in their natural state, but contain valuable elements that can only be released by some metallurgical or chemical treatment. They are illus-

trated by the compounds containing metals, which in their natural state are called ores. The mode of occurrence of the ores, as well as of the non-metalliferous minerals, is the proper field of study of Economic Geology, while the methods employed in their production belong to Mining and Metallurgy.

I. The forms and occurrence of the larger rock masses have already been referred to under Petrology and Structural Geology. The other non-metallic substances will be described in the articles on each specific substance. It is, therefore, only necessary to give as introductory articles those descriptive of the occurrence of the ores. See:

Ore
Ore Deposits
Gangue
Footwall
Hanging Wall
Pinch
Dike
Vein
Lode

II. THE METALLIFEROUS ORES:

1. *Iron Ores*:

Limonite
Hematite
Magnetite

Siderite
Franklinite
Bog-Iron Ore
Blackband Ironstone
Pyrite
Pea Ore

2. *Gold Ores:*

Gold
Calaverite
Hessite

3. *Platinum*

4. *Silver Ores:*

Silver
Argentite
Pyrargyrite
Cerargyrite
Proustite
Stephanite

5. *Copper Ores:*

Chalcopyrite
Cuprite
Malachite

6. *Lead Ores:*

Galena
Anglesite
Cerussite
Pyromorphite

7. *Zinc Ores:*

Blende
Willemite
Zincite
Franklinite
Smithsonite
Calamine

8. *Mercury Ores:*

Cinnabar
Calomel

9. *Manganese Ores:*

Pyrolusite

Manganite
Psilomelane

10. *Aluminum Ores:*

Cryalite
Gibbsite
Bauxite

11. *Tin Ore:*

Cassiterite

12. *Nickel Ores:*

Millerite
Pyrrhotite

13. *Antimony Ore:*

Stibnite

III. THE CARBON MINERALS:

1. Coal

Anthracite
Bituminous Coal
Jet
Lignite
Torbanite
Peat

2. Petroleum

Gas, Natural

3. Asphalt

Bitumen
Albertite
Grahamite
Gilsonite
Maltha

4. Ozocerite

Asphaltic Coal
Mineral Tallow

5. Graphite

IV. BUILDING MATERIALS:

Building Stone
Granite
Sandstone

Limestone
 Freestone
 Marble
 Onyx Marble
 Flagstone
 Caithness Flagstone
 Slate
 Bath Stone
 Caen Stone
 Brownstone
 Puzzuolana

V. SOILS, CLAYS, FERTILIZERS, AND WATERS:

1. Humus
 Soil
 Loam
 Loess
2. Clay
 Potters' Clay
 Fire Clay
 Pipe Clay
 Brick Clay
 Kaolin
3. Gypsum
 Apatite
 Phosphorite
 Marl
 Guano
4. Mineral Waters
 Spring
 Artesian Wells

VI. SALTS:

Salt
 Bay Salt
 Borax
 Bromine
 Iodine

VII. PRECIOUS STONES:

Diamond

Corundum
 Quartz
 Emerald
 Ruby
 Beryl
 Chrysoberyl
 Sapphire
 Aquamarine
 Tourmaline
 Spodumene
 Amethyst
 Opal
 Alabaster
 Chalcedony
 Carnelian
 Sardonyx
 Aragonite
 Agate
 Jasper
 Chrysolite
 Turquoise
 Topaz
 Garnet
 Rhodonite
 Chrysocolla
 Catlinite
 Benitoite
 Smithsonianite

VIII. ABRASIVES:

Abrasives
 Diamond
 Grindstone
 Buhrstone
 Oil-Stone
 Novaculite
 Emery
 Corundum
 Carborundum
 Garnet
 Diatomaceous Earth
 Tripolite
 Pumice

IX. PIGMENTS:

Mineral Paints
Graphite
Ochre
Umber
Burnt Sienna
Chalk
Hematite
Slate

Solenhofen Lithographic Stone

Talc
Soapstone
Mica
Feldspar
Fluorite
Sulphur
Asbestic
Asbestos
Magnesite
Fuller's Earth
Monazite

X. MINERALS USED IN VARIOUS ARTS:

Lithographic Stone

G. Biographies of Eminent Geologists

Barrande, J.
Beyrich, H. E. B.
Bishop, K. G.
Brongniart, A.
Buch, L. von
Buckland, W.
Chamberlin, T. C.
Conybeare, W. D.
Cope, E. D.
Cotta, B. von
Dana, J. D.
Darwin, Charles
Daubrée, G. A.
Dawson, Sir J. W.
De la Beche, Sir H. T.
Elie de Beaumont, J. B.
Eichwald, K. E.
Emmons, E.
Forbes, J. D.
Gaudry, A.
Geer, G. de
Geikie, Sir Archibald
Goldfuss, G. A.
Hall, Sir James
Hall, James
Hayden, F. V.
Heer, O.
Heim, A.

Hitchcock, E.
Humboldt, F. H. A. von
Hutton, J.
Koninck, L. G.
Lapparent, A. A. C. de
Lea, I.
Le Conte, J.
Logan, Sir William
Lyell, Sir Charles
Marcou, J.
Marsh, O. C.
Miller, H.
Mojsisovics, E. von
Murchison, Sir R. I.
Newberry, J. S.
Orbigny, A. D. d'
Owen, Sir R.
Phillips, J.
Playfair John
Powell, J. W.
Prestwich, Sir Joseph
Ramsay, Sir A. C.
Roemer, F. A.
Rosenbusch, H.
Saussure, H. B. de
Schimper, W. P.
Sedgwick, A.
Silliman, B.

Smith, W.
Sowerby, J.
Strickland, H. E.
Suess, Eduard
Unger, F.

Werner, A. G.
Winchell, A.
Woodward, S. P.
Zittel, K. A. von

Chapter 23. Meteorology

METEOROLOGY is the study of the atmosphere, its static conditions and appearances, and the changes and movements of all kinds which take place in it. The two principal constituents of the atmosphere are the air and the moisture in various forms which the air holds in suspension. Weather and climate are principally determined by the conditions under which these two constituents exist, at any particular time or habitually. The static conditions of the air which mainly affect the weather are its temperature and its pressure; its movements come under the general term wind. The moisture of the atmosphere, unlike the bulk of the air, is continually changing its identity. It is raised from surface waters by evaporation, held for a time in suspension under various forms, and then returned to the earth's surface by various modes of precipitation.

Besides these two sets of phenomena, the electrical conditions of the atmosphere form an important element of the weather. Other causes sometimes bring about peculiar or unusual weather conditions, and, aside from weather in its strict sense, meteorology takes cognizance of the peculiar optical appearances which the atmosphere presents. These considerations, together with the fact that the practical aspects and practical rather than theoretical investigations hold, perhaps, a more prominent place in meteorology than in other natural sciences, serve to indicate the main divisions of the subject. A considerable number of instruments are used in meteorological investigations, and the articles describing these will be referred to in connection with the appropriate subdivision.

I. GENERAL PRINCIPLES OF THE SCIENCE. See:

Meteorology
Atmosphere
Polarization of Sky Light
Dust
Climate
Weather

2. The instruments used in measuring temperature and radiation are described under:

Thermometer
Actinometer
Actinograph
Radiometer
Pyrheliometer

II. TEMPERATURE AND PRESSURE.

1. The theory and investigation of temperature and its causes are treated under:

Temperature, Terrestrial
Cold Wave
Frost
Snow Line
Actinometry
Thermometry
Seasons

3. For atmospheric pressure and the instruments used in measuring it, see:
Barometer

III. WINDS.

1. There are certain general forms of wind movements recognized without reference to localities. See:

Wind
Storm
Whirlwind

Tornado

Waterspout

Gale

2. On the other hand, in certain parts of the world peculiar local conditions produce winds which have received local names. See:

Doldrums

Calm Latitudes

Blizzard

Chinook

Etesian Winds

Harmattan

Hurricane

Mistral

Sirocco

Monsoon

Simoom

Equinoctial Storm

3. For the instruments and methods used in measuring or observing the winds, see:

Anemometer

Anemograph

Anemoscope

Beaufort Scale

IV. EVAPORATION AND PRECIPITATION.

1. See the general article:

Evaporation

2. The various forms in which moisture is held suspended are described under:

Humidity

Haze

Fog

Cloud

3. For the various forms of precipitation, see:

Dew

Hoar Frost (under Frost)

Rain

Cloudburst

Snow

Hail

4. For the instruments used in measuring or observing the moisture of the atmosphere, see:

Hygrometer

Drosometer

Nephoscope

Rain Gauge

V. ELECTRICAL CONDITIONS AFFECTING THE WEATHER. See:

Atmospheric Electricity

Lightning

Lightning, Accidents from

Lightning, Protection from

VI. PECULIAR OR UNUSUAL WEATHER CONDITIONS ARE DESCRIBED IN THE ARTICLES:

Dust

Dark Day

Black Rain

Blood-Rain

Indian Summer

VII. OTHER PHENOMENA OF THE ATMOSPHERE BELONG MAINLY TO OPTICAL APPEARANCES OR ELECTRICAL DISPLAYS. See:

Rainbow

Fog-Bow

Halo

Scintillation

Mirage

Fata Morgana

Aurora Borealis

Elmo's Fire, Saint

Castor and Pollux

VIII. PRACTICAL INVESTIGATIONS IN METEOROLOGY ARE GENERALLY CONDUCTED BY GOVERNMENT BUREAUS. See:

Weather Bureau

Signal Corps, U. S. Army

These bureaus warn the public by a system of signals. See:

Storm and Weather Signals

And in this connection also:

Fog Signals

They also issue daily weather maps.

See:

Isothermal Lines

Isobarometric Lines

Isograms

Isabnormal Lines

Isanomalous Lines

**IX. FOR BIOGRAPHIES OF THE MOST
PROMINENT METEOROLOGISTS, see:**

Abbe, Cleveland

Espy, James Pollard

Fonvielle, Wilfrid de

Maury, M. F.

Pernter, J. M.

Wild, H.

Chapter 24. Geography

GEOGRAPHY is the description of the surface of the earth in all its aspects. Just as the place where the atmosphere is where the lithosphere meets the hydrosphere, so do the sciences of METEOROLOGY and GEOLOGY meet in that of GEOGRAPHY, and the last to a certain extent encroaches upon the fields of the other two. The subject is very wide, covering a regional study of the upper layers of the earth's crust, a regional study of the atmosphere, or the climatic conditions prevailing on the various parts of the surface. Thus, in the consideration of any region on the earth, we should study the character of the land configurations, the bodies of water (rivers, lakes, seas, etc.) and their influences, the flora and fauna and their relationship to the other physical features, and, finally, the human inhabitants, their character and activities. Of course, we should also consider region as a whole and its relationship to other parts of the earth.

The whole subject may be broadly divided into three main branches: Mathematical Geography, which deals with the form, dimensions, and position of the earth, and the methods of its delineation; Physical Geography, which is a general discussion of the various natural features of the earth's surface, and Political, Regional, or Descriptive Geography, which gives detailed and specific descriptions of the separate parts of the earth's surface, generally as its human inhabitants have divided it among themselves, all their varied activities, and all the artificial changes which they have made, and the structures which they have built.

A. Mathematical Geography

I. GENERAL. See:

Earth
Pole
Equator, Terrestrial
Meridian
Latitude and Longitude
Degree of Latitude
Degree of Longitude
Tropics
Geography
Zone

Globe
Coast and Geodetic Survey
Geodesy
Surveying

III. TERRESTRIAL MAGNETISM. See:

Magnetism, Terrestrial
Declination
Dip
Isoclinic
Isogonic Lines
Isodynamic Lines
Compass
Theodolite
Sextant

II. METHODS OF DELINEATION. See:

Map
Chart

B. Physical Geography

Under this head will be given the articles dealing with geographical features that are due to various geological or climatic causes. The articles on the causes themselves are referred to under Geology and Meteorology. At the end of each subdivision are given the articles on the most remarkable examples of the features discussed. In connection with this section the departments of Zoölogy and Botany should also be consulted.

I. GENERAL ARTICLE. See:

Physiography

II. OCEANOGRAPHY:

Oceanography
Ocean
Deep-Sea Exploration
Sounding
Abysmal Accumulations
Oceanic Deposits
Ocean Currents
Tides
Bore
Channel
Shore
Gulf Stream
Atlantic Ocean
Pacific Ocean
Indian Ocean

III. GENERAL LAND FORMS:

Aiguille
Archipelago
Butte
Cordillera
Continent
Island
Isthmus
Mountain
Valley

Plateau
Sierra
Basin
North America
Australia
Himalaya
Malay Archipelago
Panama, Isthmus of
Sierra Nevada

IV. HYDROGRAPHY:

Hydrography
Bayou
Bog
River
Divide
Waterfall
Inundation
Flood Plain
Delta
Reef
Bar
Lake
Floating Island
Mississippi River
Amazon River
Nile
Great Lakes

V. GEOGRAPHICAL FEATURES DUE TO MOVEMENTS OF THE EARTH'S CRUST:

Beaches, Raised
Earthquake
Estuary
Fiord
Coastal Plain
Great Rift Valley

VI. FEATURES DUE TO VOLCANIC ACTION:

Volcano
Crater

Geyser

Dike

Laccolite

Vesuvius

Etna (*Ætna*)

Krakatoa

Pelée, Mont

Hecla

Mauna Loa

Kilauea

Soufrière, La

Popocatepetl

Yellowstone National Park

Palisades

Giant's Causeway

Staffa

VII. FEATURES DUE TO EROSION:

Erosion

Piedmont Plain

Bad Lands

Cliff

Talus

River Terraces (under Terrace)

Cañon

Mesa

Sink Hole

Cave

Karst

Delaware Water Gap

Colorado River

Niagara River and Falls

Victoria Falls

Mammoth Cave

Luray Cave

Natural Bridge

Yosemite Valley

VIII. FEATURES DUE TO GLACIAL ACTION:

Glacier

Moraine

Iceberg (under Ice)

Avalanche

Drumlin

Eskers

Giants' Kettles

Rocking Stones

Mer de Glace

Gorner Glacier

IX. FEATURES DUE TO WIND ACTION:

Dune

Medano

Musical Sand

X. FEATURES DUE TO PECULIAR SOIL OR CLIMATIC CONDITIONS:

Desert

Oasis

Prairie

Savannas

Steppe

Tundra

Downs

Llanos

Pampas

Karoo

Sahara

Gobi

XI. FEATURES DUE TO THE ACTION OF ANIMALS:

Coral Island

Atoll

Barrier Reef

C. Political or Regional Geography

This is by far the most important part of geographical study, and, taken as a whole, is probably the largest and most valuable department of the *NEW INTERNATIONAL ENCYCLOPEDIA*. Lack

of space makes it impracticable to enumerate all of the important articles in the work connected with a study of Political Geography. The next best thing would be an outline of geograph-

ical history and knowledge, which would of itself suggest further fields of investigation.

The earliest geographic knowledge dates back to about 600 B. C. Hecataeus was one of the first cartographers, and at about 500 B. C. made a map of the world as known then, showing the existence of two continents. Herodotus distinguished three continents, Aristotle demonstrated that the world was round, and Eratosthenes computed the length of the earth's circumference to be 25,000 miles. Ptolemy extended the knowledge of the world by a vast amount and drew maps that were used by Columbus over thirteen centuries later.

In the line of exploration, the Phœnicians were the first nation of discoverers. With the Carthaginians and the Egyptians their trading brought them into many unknown regions, which they frequently colonized. The Arabs contributed a large amount of geographic knowledge during the Middle Ages and the Norsemen colonized Iceland and Greenland and explored the northern seas.

The names connected with geographical knowledge up to the fifteenth century, when the period of modern explorations began, are in the following list:

I. ANCIENT:

Hecataeus of Miletus
Herodotus
Eratosthenes
Pythagoras
Ptolemy
Aristotle
Strabo
Tyre
Pytheas of Marseilles

Alexander the Great

Masudi

Edrisi

Ibn Batuta

Ericson, Lief

Benjamin of Tudela

II. MEDIEVAL:

Rubruquis

Polo, Marco

Clavijo

Conti, Niccolò dei

Modern exploration dates from the fifteenth century, particularly from the time of Prince Henry of Portugal. The discovery of the Cape of Good Hope and the utilization of the magnetic compass lent impetus to the navigation of the high seas and consequent discoveries. These were at first confined to Africa, in a search for an all-water route to India. Then came Columbus, who discovered the West Indies (America). This marked the beginning of a series of discoveries that resulted in the uncovering of the entire Western Hemisphere and the establishment of the main features of the globe on both land and sea. With this accomplished, the attention of the world turned to the opening up and development of the newly discovered lands. North and South America, Africa, Asia, Australia, and many of the Pacific Islands were all fields of endeavor in the search for growth of trade and wealth. Many places were discovered and explored by men of different countries and disputes frequently arose over their possession. All of the maritime nations, particularly Portugal and Spain, took part, the names of hundreds of men finding their way into the annals of history.

In the following list are men prominent in early exploration and discovery. The names will suggest articles on the regions explored and other places affected.

Men and places involved in early discovery and exploration:

I. SOUTH AMERICA:

Pizarro, Francisco
 Drake, Sir Francis
 Hawkins, Sir Richard
 Magalhães, Fernão de

II. NORTH AMERICA:

Columbus, Christopher
 Vespucci, Americus
 Cabot, John
 Cabot, Sebastian
 Balboa, Vasco Nuñez de
 Cortés, Hernán
 Soto, Hernando de
 Cartier, Jacques

III. AFRICA:

Cadamosto
 Días de Novas, Bartholomeu
 Gama, Vasco da
 Henry the Navigator

IV. SOUTH SEA AND PACIFIC OCEAN:

Tasman, Abel Janszoon
 Cook, Capt. James
 Entrecasteaux, Joseph Antoine
 Bruni, Chevalier d'

Exploration in Africa, at first entirely confined to the Portuguese, became the attention of other nations toward the end of the 18th century, when James Bruce, an Englishman, seeking the source of the Nile, discovered the Blue Nile. He heads a very long list of African explorers, more prominent among whom are Mungo Park, Heinrich Barth, David Living-

stone, H. M. Stanley, Gerhard Rohlfs. There are still parts of this continent, South America and Asia, which are quite unknown. These are slowly being uncovered by men who are accomplishing difficult and arduous tasks with little or no glory.

The main attention of the world in modern times has been directed toward the explorations of the Polar Regions. At first actuated by purely commercial incentives, the efforts of explorers today are directed in the interest of science. The earliest explorations in the North Polar regions, however, were caused by the search for the Northwest Passage to the Orient. The men prominently connected with this in particular were the Cabots, Henry Hudson, Parry, Cook, Rae, Simpson, Franklin and McClure. The Antarctic has received less attention than the northern fields on account of its remoteness, and it is only recently that any valuable work has been done there. In this connection Shackleton, Scott and Amundsen stand out prominently among the few South Polar explorers.

Recent successes in the Polar Regions are directly attributable to the lessons learned in early work there and to the advance in scientific knowledge, which gave to the men advantages never had by early explorers. Both Poles have finally been attained, the North Pole by Peary (April 6, 1909), and the South Pole by Amundsen (December 4, 1911) and Scott (January 18, 1912). See articles **POLAR RESEARCH**, **NORTHWEST PASSAGE**.

POLAR EXPLORERS. See:

Amundsen, R.
 Back, G.

Baffin, W.
 Barents, W.
 Bering, V.
 Cook, J.
 Franklin, J.
 Greely, A. W.
 Hudson, H.
 Kotzebue, O. von
 McClure, R. J. le M.
 Mawson, D.
 Nansen, E.
 Nordenskiöld, N. A.
 Parry, W. E.
 Payer, S.
 Peary, R. E.
 Ross, J. C.
 Ross, J.
 Scott, R. F.
 Shackleton, E. H.
 Stefansson, V.
 Sverdrup, O.
 Vancouver, G.
 Vilkitsky, B. A.
 Wellman, W.
 Weyprecht, K.
 Wilkes, C.

Lack of space forbids anything like an enumeration of even the more important articles describing the various parts of the earth and their inhabitants. The bulk of minor gazetteer articles are intended only for incidental reference, when information about a particular locality is desired. Nevertheless, it would be possible to plan a very instructive and interesting course of systematic reading in descriptive geography.

One way would obviously be to read first the articles on the larger divisions of the earth, EUROPE, ASIA, AFRICA, AMERICA, AUSTRALIA, ARCTIC REGION, and ANTARCTIC REGION, and, in the latter connection, the article on

POLAR RESEARCH. These articles give, besides, a general geographic and ethnographic description, and a history of exploration and discoveries from ancient to recent times. They also refer to the separate divisions of the larger land areas, and, by reference to the articles on these divisions, the reader will be carried successively into narrower and narrower fields with more and more detailed description.

The story of explorations and discoveries, and of the science of geography, may also be carried further by means of the following names and titles:

Andrée, S. A.
 Baker, S. W.
 Barth, H.
 Behaim, M.
 Borchgrevink, C. E.
 Brazza, P.
 Burckhardt, J. L.
 Burton, R. F.
 Chancellor, R.
 Flinders, M.
 Gray, R.
 Hakluyt, R.
 Hedin, Sven
 Johnston, H. H.
 Kane, E. K.
 Kiepert, H.
 Kingsley, M. H.
 Kohl, J. G.
 La Hontan, A. L.
 Lander, R. L.
 Lapérouse, J. F.
 Lockwood, J. B.
 Major, R. H.
 Malte-Brun, K.
 Markham, C. R.
 Przhevalski, N. M.
 Ratzel, F.
 Ravenstein, E. G.

Reclus, E.
Rennel, J.
Ritter, K.
Speke, J. H.
Sturt, C.

Still another method of carrying on the study of geography would be to study the maps, and, wherever a particular region found there excites the reader's curiosity, turn to the appropriate article. Many other ways will suggest themselves, according to the individual's tastes, inclination, or requirements, and it will be found that an encyclopædia is the best means of gaining, not only a minute knowledge of any particular locality on the earth's

surface, but also a broad perspective view of the whole field of human activity. For the gazetteer articles are not to be regarded merely as dealing with topics in geography. Taking any of the articles on the various countries of the globe, as the UNITED STATES, or JAPAN, such article may be made to supply detailed information on whatever topic may be the subject of study or reading: Zoölogy, Geology, Statistics, Finance, Education, Industry, or Transportation. To quote these articles and the accompanying maps would be to encumber the book with enormous lists of names, which the reader may be trusted readily to select for himself.

Chapter 25. Botany

BOTANY is the science that deals with plants in all their aspects,—their origin and development, nature, structure, life processes, classification, and distribution. The nature and origin of plants will be discussed in the general articles given below. All considerations of the form and structure of individual plants may be broadly classed under the general term Structural Botany, or Plant Anatomy. The study of the processes which constitute the life of a plant and the conditions which affect those processes is called Physiology. These two branches of the science are sometimes united under the term General Botany, as distinct from Specific or Systematic Botany, also called Taxonomy, which deals with the classification and description of the various kinds of plants. A somewhat recently established branch of the science is that of Ecology, which deals with the distribution of plants in general. Another branch represents the practical aspects of botany by a particular investigation of the plants which can be made to enter into human economy. This is Economic Botany, the science which has the closest bearing on the arts of agriculture and horticulture. For a general discussion of botanical science, see:

Botany
Biology
Evolution
Heredity

Botanical Laboratories (under Laboratory)
Botanic Garden
Herbarium
Index Kewensis

For General Methods of Botanical Investigation, see:

A. Structural Botany

This subject deals with the form and structure of individual plants, of the plant body as a whole, of its separate limbs and organs, of the various tissues of which these are composed, and of the minute structures of the cells which compose the tissues. The study of the individual cell has recently received so much attention that it has been elevated from a branch of Histology, which deals with the microscopic nature of tissues, to the separate science of Cytology. The study of the varying types of organs has been called Morphology, and this branch may be

divided into the morphology of the sterile or vegetative organs and the morphology of the reproductive organs.

For General Articles on Structural Botany, see:

Vegetable Tissue
Anatomy of Plants
Growth (in Plants)
Morphology

I. CYTOLOGY. A description of the general structure and contents of the cell is given in the articles:

Cytology

Cell (in Plants)
 Intercellular System
 Protoplasm
 Nucleus
 Osmosis
 Plasmolysis
 Movement
 Rotation

For the composition of the cell wall, see:

Cellulose
 Lignin
 Lignification
 Micellar Theory

For the structure of the nucleus, see:

Nucleolus
 Linin
 Chromatin
 Chromosome
 Centrosome

For the cytoplasm, see:

Microsome
 Plastids

The protoplasmic contents include a considerable variety of coloring matter. See:

Color in Plants
 Chromoplast
 Chromatophore
 Endochrome
 Chloroplast
 Anthocyan
 Chlorophyll
 Leucoplasts
 Elaioplasts
 Erythrophyll
 Etiolin
 Etiolation
 Carotin
 Cyanophyll
 Phycoerythrin

Phycophaein
 Pyrenoid

Besides the protoplasm the cell often contains crystals and other bodies.

See:

Raphides
 Aleurone
 Inulin
 Starch

Finally the various constituents of the sap, digestive ferments, and secretions:

Sap
 Sugar
 Glucose
 Enzyme
 Diastase
 Cytase
 Lipase
 Invertase
 Oxidase
 Pectase
 Zymase
 Latex

The mechanics of cell division are described under:

Mechanics of Development
 Fission
 Mitosis
 Karyokinesis
 Blepharoplast

II. HISTOLOGY. A general discussion of plant tissues is given in the article HISTOLOGY, section on *Histology of Plants*.

Tissues are variously classified. According to their general nature, the two most important kinds are described under:

Parenchyma
 Collenchyma

In higher plants, the tissues are gen-

erally differentiated into three main systems. See:

Pith
Wood
Cortex

The general articles on woody tissue are:

Alburnum
Duramen
Vascular Tissue
Conducting Tissue
Mechanical Tissue
Mestome
Plerome

For the special structure of wood, see:

Fibrovascular Bundle
Fibre
Phloem
Bast
Hadrome
Leptome
Tylosis
Tracheæ (under Anatomy of Plants)
Tracheid
Sieve Vessels
Cambium
Pericycle
Medullary Ray

The various tissues found in the cortex are described in the articles:

Meristem
Epidermis
Cuticle
Endodermis
Hypodermis
Periblem
Dermatogen
Bark
Cork
Phelloderm
Phellogen

Other special forms of tissue are:

Aërenchyma
Palisade Cells
Mesophyll

III. MORPHOLOGY OF THE VEGETATIVE ORGANS.

For the general forms of plant bodies, see:

Thallus
Herb
Shrubs
Tree
Juvenile Forms

Some of the special forms or organs of fungi are described under:

Hypha
Mycelium
Plasmodium
Pileus

Higher plants are generally differentiated into stem, root, and leaves, all of which may carry minor organs or appendages. See:

Stem
Root
Leaf

For special forms of stems, see:

Tuber
Corm
Internode
Fasciation
Phylloclad

For their mode of branching:

Branching
Monopodial Branching
Dichotomy

For the forms and appearance of leaves, see:

Fronde
Pinnule
Phyllodes

Petiole
 Venation
 Variegation
 Anisophylly
 Heterophylly

For their arrangement in the bud,
 see:

Leaf-Buds (under Bud)

The forms and appendages of the
 roots are described in the articles:

Root
 Rhizoids
 Root Tubercles

For the organs of respiration and
 exudation, see:

The Aërating System (under Anat-
 omy of Plants)

Stomata
 Lenticels
 Hydathode

For the organs of support and sim-
 ilar use, see:

Tendrils
 Haustoria

Other appendages of plants are de-
 scribed under:

Trichome
 Gland
 Cilia of Plants
 Bloom

IV. MORPHOLOGY OF THE REPRO- DUCTIVE ORGANS.

The vast majority of plants produce
 at certain periods of their life-history
 two sets of reproductive organs, the
 sexual and the asexual; and, in all
 plants above the algæ and fungi, these
 follow each other regularly in alter-
 nate generations. (See the general
 articles on sexual processes referred to
 under Physiology.) In this section,
 only those articles will be given which

describe the sexual and asexual repro-
 ductive organs. These organs are
 present in some form throughout large
 classes of plants. Special morphology
 will be discussed under the appropriate
 heads in Systematic Botany.

Asexual reproduction is effected by
 spores and by vegetative off-shoots.
 For the latter, see:

Bud
 Gemma
 Bulb

For the organs of spore-reproduc-
 tion, see:

Spore
 Intine
 Homospory
 Heterospory
 Microspore
 Megaspore
 Sporangium
 Microsporangium
 Megasporangium
 Sporophyll
 Microsporophyll
 Megasporophyll

The organs of sexual reproduction
 are:

Gamete
 Generative Cell
 Oöspere
 Sperm
 Antheridium
 Archegonium
 Oögonium
 Paraphyses
 Oöspore

In the higher plants (Spermato-
 phytes), the two sets of reproductive
 organs, sexual and asexual, are enclosed
 together in the flower. See:

Flower
 Seed
 Fruit

For the various modes in which flowers are arranged on the plant, see :

Inflorescence
Panicle
Cyme
Corymb
Ament
Disk

The parts of a flower are described in the articles :

Involucre
Calyx
Pappus
Corolla
Petal
Ligule
Nectary
Pistil
Ovary
Carpel
Ovule
Placenta
Stamen
Anther
Pollen

Epigyny
Hypogyny
Perigyny

The articles on the seed are :

Seed
Endosperm
Perisperm
Ovule
Nucellus
Embryo
Suspensor
Cotyledon
Hypocotyl

For the various kinds of fruits, see :

Achene
Berry
Capsule
Caryopsis
Drupe
Drupelet
Follicle
Glume
Legume
Nut
Pome

B. Physiology

Physiology is the science which deals with all the processes that constitute the life of an individual plant, the conditions, both internal and external, which affect plant life, and all the phenomena attending such processes and conditions. Just as we distinguish between vegetative and reproductive organs of a plant, so we may also distinguish between vegetative and reproductive life processes; and the former may be divided into the regular and constant processes, which maintain the

life of a plant, and the more occasional responses to stimuli. Abnormal and pathological conditions also come within the scope of physiology. See **PHYSIOLOGY OF PLANTS.**

I. In all perfect plants, there is a series of regular mechanical processes by which raw food material is brought to the digestive organs in the form of gases from the atmosphere, or of minerals dissolved in water from the soil; by other processes the digested food is carried to places of storage or growing

points, and the waste products are expelled from the system. See:

Respiration (in plants)

Aëration

Absorption (in plants)

Transpiration

Potometer

Imbibition

Osmosis

Turgor

Root Pressure

Conduction

Storage

Excretion

Secretion (vegetable)

II. The phenomena of digestion and growth are described in the articles:

Digestion in Plants

Food of Plants

Nutrition (in plants)

Mycorrhiza

Photosynthesis

Etiolation

Metabolism

Katabolism

Anabolism

Fermentation

Assimilation

Regeneration

Parasite, Plant

Saprophyte

Carnivorous Plants

Insectivorous Plants

Energy of Plants

Growth (in plants)

Auxanometer

Enzymes

Chloroplasts

Carotin

Etiolin

The various movements which plants are capable of are described under:

Movement

Moving Plant

Motor Organ

Locomotion

Nutation (in plants)

Plants are also capable of reacting to a great variety of stimuli. See:

Irritability

Stimulus

Tropism

Phototaxis

Heliotropism

Photoepinasty

Apheliotropism

Paraheliotropism

Nyctotropic

Sleep of Plants

Geotropism in Plants

Apogcotropism

Diageotropism

Hydrotropism

Aphydrotropism

Aërotropism

Rheotropism

Thermotropism

Chemotaxis

Chemotropism

Electrotaxis

Electrotropism

Traumatropism

Sensitive Plant

Hyponasty

Epinasty

Clinostat

Tendrils

Lianas

Reproductive processes may be divided into those which take place within the individual plant, and those which are affected by the relation of the individual plant to its environment. The latter are referred to under Ecology (see C below), while only the former are described in the following articles:

Reproduction (in plants)

Vegetative Propagation

Sex in Plants (under Sex)

Conjugation

Rejuvenescence

Isogamy

Apogamy

Parthenogenesis

Vivipary

Fertilization

Germination

Alternation of Generations

Gametophyte

Sporophyte

A discussion of the abnormal and pathological in plant life is given in the articles:

Teratology

Monstrosity

Malformation

Abortion in Plants (under Abortion)

Vestigial Structures

Concrescence

Galls

C. Ecology

Ecology is the science that deals with the relation of a plant to its environment. This relation may be that of sexual intercourse, relation to the soil, situation, climate, moisture conditions, relation to other plants and to animals, and any other external conditions that affect the situation of a plant, its growth, or the length of its life, either in the individual or in the species or race. Ecology is thus the study of the distribution of plants in the broadest sense. See:

Ecology

Distribution of Plants

Bionomics

Floristics

Dysteleology

Adaptation

Epharmony

1. The relations of the reproductive functions of a plant to the environment are discussed in the articles:

Pollination

Pollen

Hybrid

Dispersal

The special arrangements which

affect cross-pollination are described under:

Cleistogamy

Allogamy

Geitonogamy

Monœcism

Diœcism

Dichogamy

Entomophilous Plant

Anemophilous Plants

Hydrophilous

For the relation of plants to the soil, see:

Humus Plants

Lime Plants

Clay-Plants

Nitrophilous Plants

Halophyte

Dune Vegetation

Rock Plants

Epiphyte

For the relation of plants to general localities, see:

Autochthonous

Endemism

Naturalization

Migration of Plants

and, to specific situations:

Mountain Plants

Alpine Plant

Cliff-Plants

Beach Plants

Ruderal Plants

Hylophytes

Benthos

Enalids

Plankton

For the relation of a plant to moisture and climate, see:

Hydrophytes

Hygrophytes

Mesophyte

Amphibious Plants

Xerophytes

Desert Vegetation

Arctic Plants (under Arctic Region)

Acclimatization

Phenology

The relation of a plant to other plants, and to animals, may be considered under two aspects:

(a) There is often a close sympathetic relation between individual plants, and between an individual plant and animals. See:

Symbiosis

Endophyte

Epiphyte

Parasite, Plant

Obligate Plants

Facultative Plant

Entomophilous Plant

Myrmecophytes

Phycomycetes

(b) There is also a general relation due to soil, climate, struggle for existence, etc., between large numbers of individuals growing together and constituting what are known as plant societies. See:

Distribution of Plants

Form

Formation

Forest

Jungle

Thicket

Grasslands

Savannas

Steppe

Prairie

Llanos

Pampas

Meadow

Tundra

Swamp

Mangrove Swamp

Cypress Swamps

The nature of plant societies is also largely affected by the vegetative duration of its members. See:

Duration

Annuals

Biennials

Perennials

Æstival

Vernal Grass

Deciduous Plants

Evergreen

Geophyte

D. Systematic Botany

This branch of the science of Botany comprises the classification of plants, the description of every known species

and of the larger divisions—genera, families, orders, classes, etc.—into which all species are grouped. Sys-

tematic Botany also includes the study of the relationships between the various groups and species of plants, and of their geographical distribution. It is obviously impossible here to refer to all the articles on even the more important genera; but, as the representative genera of each order are referred to in the article on the order, it is sufficient to give only the latter and the higher groups. For a general article on systematic botany, see **TAXONOMY**.

The whole vegetable kingdom is generally divided into four sub-kingdoms. See:

Thallophytes
Bryophytes
Pteridophytes
Spermatophytes

I. The Thallophytes are divided into two parallel series. See:

Algæ
Fungi

1. The Algæ are generally grouped into four classes. See:

Cyanophyceæ
Chlorophyceæ
Phæophyceæ
Rhodophyceæ

2. For the main divisions of the Fungi, see:

Myxomycetes
Schizomycetes
Ustilaginales
Phycomycetes
Ascomycetes
Uredinales
Basidiomycetes
Lichens

II. The Bryophytes are grouped in two main divisions. See:

Hepaticæ

Musci

III. The living Pteridophytes fall into three main groups, the last two of which are generally called "the higher fern." See:

Fern
Equisetum
Lycopodiales

IV. The Spermatophytes, or seed-plants, form the bulk of the vegetation which covers the earth. They are divided into two classes. See:

Gymnosperms
Angiosperms

1. The living Gymnosperms are grouped into four orders. See:

Coniferæ
Cycadaceæ
Gnetaceæ
Ginkgo

2. The Angiosperms consist of numerous orders, which fall into two natural sub-classes. See:

Monocotyledons
Dicotyledons

(a) The principal orders of Monocotyledons are described under:

Pandanaceæ
Typha
Gramineæ
Cyperaceæ
Palm
Arum
Bromeliaceæ
Liliaceæ
Smilaceæ
Amaryllidaceæ
Dioscoreaceæ
Iridaceæ
Musaceæ
Zingiberaceæ
Orchid

(b) The following are the most important orders of Dicotyledons, arranged in their order of relationship. Important genera of orders not separately described are inserted in their proper places.

Archichlamydeæ:

Mainly Apetalous. Chiefly
Trees:

Piperaceæ
Juglandaceæ
Willow
Poplar
Birch
Alder
Cupuliferæ
Moraceæ
Urticaceæ
Elm

Chiefly Weeds:

Polygonaceæ
Chenopodiaceæ
Amarantaceæ
Mesembryaceæ
Caryophyllaceæ

Mainly Polypetalous. Butter-
cup Types:

Nymphæaceæ
Magnolia
Ranunculaceæ
Berberidaceæ
Lauraceæ

Poppy Types:

Papaveraceæ
Fumariaceæ
Cruciferæ

Insectivorous Plants:

Sarracenia
Sundew

Rose Types:

Saxifrage

Plane

Rosaceæ

Leguminosæ

Geranium Types:

Geranium
Zygophyllaceæ
Polygala
Euphorbiaceæ

Maple Types:

Burseraceæ
Anacardiaceæ
Holly
Maple
Sapindaceæ
Horse-Chestnut

Buckthorn Types:

Rhamnaceæ
Vitaceæ

Mallow Types:

Tiliaceæ
Malvaceæ

Violet Types:

Ternstroemiaceæ
Violaceæ

Cactus Type:

Cactus

Myrtle Types:

Lythraceæ
Myrtaceæ

Carrot Types:

Umbelliferæ
Dogwood

Sympetalæ:

Heath Types:

Ericaceæ
Huckleberry

Primrose Type:

Primulaceæ

Ebony Types:

Sapotaceæ
Ebony

Gentian Types:

Loganiaceæ
Gentianaceæ
Apocynaceæ
Asclepiadaceæ

Phlox Types:

Convolvulaceæ
Polemoniaceæ
Boraginaceæ
Labiatæ

Solanaceæ
Scrophulariaceæ
Bignonia

Madder Types:

Rubiaceæ
Caprifoliaceæ

Bell-Flower Types:

Cucurbitaceæ
Campanulaceæ
Compositæ

E. Economic Botany

In its narrow sense, viewed as a strictly botanical science, economic botany is the study of those plants which are, or can be, used for some purpose in human economy. If we inquire further into the methods by which these plants are made available, we enter upon the fields of agriculture, pharmacy, mechanical arts, etc. By the above definition, economic botany includes a study of the common cultivated plants, such as the cereals, but, to avoid repetition, the cultivated plants are referred to only in the chapter on Agriculture, Horticulture, and Forestry. We shall therefore confine ourselves here to the articles describing the important wild, or not commonly cultivated, economic plants, classified according to their uses.

I. PLANTS USED FOR FOOD:

Adansonia
Areca
Banana
Brazilnuts
Breadfruit Tree
Butter-Tree
Caryocar
Caryota

Cashew Nut
Cherimoyer
Cocco
Cocoonut
Euryale
Fungi, Edible
Granadilla
Grass-Tree
Hog-Plum
Iceland Moss
Jubæa
Mammec Apple
Maple
Mushroom
Nelumbo
Palmyra Palm
Papaw
Prickly Pear
Reindeer Moss
Sago
Tamarind
Ti
Walnut
Water-Chestnut

II. PLANTS USED IN PREPARING BEVERAGES:

Beverage Plants
Agave
Assai

Ava
 Buriti Palm
 Carrageen
 Elder
 Maté
 Palmyra Palm
 Sloe
 Woodruff

III. PLANTS USED AS CONDIMENT OR IN CONFECTIONERY:

Flavoring Plants
 Anise
 Caper
 Cardamom
 Cinnamon
 Coriander
 Ginger
 Jujube
 Juniper
 Laurel
 Licorice
 Marjoram
 Marsh-Mallow
 Mint
 Pepper
 Tonka Bean
 Vanilla

IV. PLANTS USED IN PERFUMERY:

Boswellia
 Lemon-Grass
 Lignum Rhodium
 Lily of the Valley
 Musk Plant
 Myrrh
 Patchouli
 Ylang Ylang

V. PLANTS YIELDING PIGMENTS:

Alkanet
 Aloe
 Brazil Wood
 Buckthorn
 Butea

Camwood
 Chay Root
 Fustic
 Henna
 Indigo
 Logwood
 Marking-Nut
 Walnut
 Weld
 Yam
 Zamia

VI. PLANTS YIELDING GUMS, WAX, OILS, ETC.:

Butter Tree
 Calophyllum
 Canarium
 Candleberry
 Candle-Nut
 Carnauba Palm
 Cashew Nut
 Dammar
 Elæococca
 Fir
 Grass-Tree
 Mastic
 Mesquite Tree
 Oil Palm
 Pine
 Tallow Tree

VII. PLANTS YIELDING FIBRE:

Agave
 Aloe
 Astrocaryum
 Attalea
 Bromelia
 Broom
 Butea
 Carnauba Palm
 Caryota
 Chamærops
 Corchorus
 Crotalaria

Eriodendron
Giant Lily
Gomuti
Jute
Kapok
Ootrum
Piassaba
Yucca

VIII. PLANTS USED FOR TIMBER AND
CABINET WOOD:

Ash
Boxwood
Butternut
Calophyllum
Cedar
Cypress
Dacrydium
Dalbergia
Elm
Eucalyptus
Fir
Gmelina
Greenheart
Guaiaicum
Hemlock Tree
Hornbeam
Ilex
Kauri Pine
Lignum Vitæ
Lime Tree
Mammee Apple
Maple
Oak
Palmetto
Palmyra Palm
Pine
Plane
Podocarpus
Spruce
Tamarind
Teak
Tulip Tree
Walnut

IX. PLANTS USED FOR ORNAMENTAL
CABINET WOODS:

Alocs Wood
Ebony
Holly
Letterwood
Mahogany
Palmyra Wood
Rosewood
Sandalwood
Satinwood

X. PLANTS SUPPLYING VARIOUS PRIM-
ITIVE NEEDS:

Bottle Gourd
Bussu Palm
Calabash Tree
Daphne
Nipa
Palmyra Palm
Papyrus
Rattan

XI. PLANTS USED DIRECTLY IN IN-
DUSTRIAL ARTS:

Carludovica Palmata
Ice Plant
Ivory, Vegetable
Myrobalan
Oak
Quebracho
Rattan

XII. MEDICINAL PLANTS:

Aconite
Acorns
Adansonia
Agrimony
Akee
Allamanda
Aloe
Alum Root
Angelica
Angostura Bark
Aristolochia
Arnica

Asarabacca
 Belladonna
 Bittersweet
 Broom
 Butterfly-Weed
 Cajeput
 Calabar Bean
 Carrageen
 Cascarilla
 Cassia
 Centaury
 Choke-Cherry
 Cinchona
 Cissampelos
 Coca
 Croton
 Cubebs
 Dill
 Dock
 Dogbane
 Elder
 Erigeron
 Ergot
 Eucalyptus
 Feverwort
 Gentian
 Geum
 Guaiacum
 Horehound
 Houseleek
 Ipecacuanha
 Jalap
 Licorice
 Mint
 Myrrh
 Poppy
 Strychnos
 Witch-Hazel
 Zanthoxylum

XIII. POISONOUS PLANTS:

Poisonous Plants
 Abrus
 Amanita

Andromeda
 Belladonna
 Bittersweet
 Bitterwood
 Calabar Bean
 Cherry-Laurel
 Coccus Indicus
 Colchicum
 Fungi, Edible and Poisonous
 Hemlock
 Henbane
 Kalmia
 Laburnum
 Manchineel
 Nightshade
 Poison Oak
 Stramonium
 Sumach
 Tanghin
 Upas

XIV. BIOGRAPHIES OF EMINENT BOTANISTS:

Adanson, M.
 Barton, W. P. C.
 Bauhin, J.
 Bentham, G.
 Bigelow, J.
 Bonnier, G.
 Boussingault, J. B. J. D.
 Braun, A.
 Brongniart, A. T.
 Brown, R.
 Brunfels, O.
 Chapman, A. W.
 Cohn, F. J.
 Darlington, W.
 De Candolle, A. L. P. P.
 Desfontaines, R. L.
 Eichler, A. W.
 Engler, H. G. A.
 Endlicher, S. L.
 Gray, Asa
 Grew, N.

Hellriegel, H.
Hooker, Sir J. D.
Hooker, Sir W. J.
Jackson, B. D.
Jussieu
Ledebour, K. F. de
Lenné, P. J.
Lindley, J.
Link, H. F.
Linnæus, Carolus
Michaux, A.
Mohl, H. von
Morong, Thomas
Muhlenberg, G. H. E.
Nees von Esenbeck, C. G.
Nuttall, T.

Persoon, C. H.
Pfeffer, W.
Plumier, Charles
Rafinesque, C. S.
Sachs, J. von
Saussure, N. T. de
Schleiden, M. J.
Schultze, M. S.
Schweinitz, L. D. von
Sullivant, W. S.
Thunberg, K. P.
Thurber, George
Torrey, J.
Tournefort, J. P. de
Unger, F.
Watson, S.

Chapter 26. Agriculture, etc.

THE systematic and artificial cultivation of plants for the purpose of supplying human necessities or luxuries constitutes the arts of Agriculture, Horticulture, and Forestry, or the cultivation of the field, the garden, and the forest. The distinctions between these three arts, however, are not so definite as one might suppose, and the apportionment among them of the articles dealing with plant culture will be more or less arbitrary. Thus Forestry and Horticulture meet in the arts of Arboriculture and Landscape Gardening. The products of Horticulture are, as a rule, luxuries rather than necessities; but the raising of vegetables for the table, although they are almost necessary articles of food, is generally treated under Horticulture rather than under Agriculture. The latter term is best confined to the cultivation on a large scale of products used extensively in human economy, and this distinction will be the basis for the following divisions of the whole subject.

A. Agriculture

Agriculture, as its name implies, is the cultivation of the field, mainly for the purpose of providing a regular supply of organic food, both plant and animal. This indicates the two main divisions of farming, namely, the raising of food plants and the raising of animals. The former is, perhaps, the more complex process, requiring a more elaborate equipment of tools and machinery. It involves the selection and preparation of the soil, the sowing of the seed, the care of the growing crop, the prevention and cure of crop diseases, and the harvesting, manipulation, and disposition of the crop when ripe. The raising of animals involves their selection and breeding, the feeding and care of the animals, attention to the numerous diseases to which they are subject, and the manipulation and disposition of animal products, including the art of dairying. In connection with both branches of agriculture, there is the general management of the farm and its equipment. For a history of

the development of agriculture in the various countries, see the article, AGRICULTURE.

I. For the general articles on the farm and its equipment, see:

- Farm Buildings
- Implements, Agricultural
- Farm Management
- Dry Farming

II. The preparation of the soil requires, first, the selection of a soil suited for the crop, and often its artificial fertilization; and, second, its tillage and irrigation.

For the selection of soil, see:

- Soil
- Humus
- Alkali Soils
- Chernozem
- Gumbo Soil
- Fallow
- Waste Lands
- Rotation of Crops

For fertilization and fertilizers, see:

- Chemistry, Agricultural

Fertilizers**Manures and Manuring****Green Manuring****Nitrification****Sewage Farming****Soil Amendments****Fish Manures****Bone Fertilizers****Guano****Marl****Compost****Gypsum****Poudrette****Lupine****Superphosphate****Thomas Slag**

The processes of tillage are described under :

Tillage**Cultivator****Plow, Plowing**

For the irrigation and drainage of the soil, see :

Irrigation**Drainage****Ditch****Mulch****Warping****Lysimeter**

When the soil has been prepared and tilled, the seed is sown. See :

Seed Testing**Broadcasting****Drill****Harrow**

When the crop is ripe, it is harvested and prepared for the market. See :

Harvest and Harvesting**Reapers, Reaping****Threshing****Hummeler****Fan, or Fanner**

III. The principal crops which are the subjects of agriculture are, of course, the food plants, and of these the most important are the cereals. Other plants, however, aside from those which are the subjects of horticulture, are also regularly cultivated, such as forage plants (see under Stock-Raising below), and plants used for fibre and various other purposes.

For the principal cereals, see :

Cereals**Barley****Buckwheat****Maize****Millet****Oat****Rice****Rye****Wheat**

Other food crops are :

Artichoke**Artichoke, Jerusalem****Bean****Beet****Cassava****Cowpea****Dolichos****Lentil****Pea****Potato****Pumpkin****Sago****Sorghum****Soy Bean****Sugar Beet****Sugar-Cane****Sweet Potato**

(For vegetables and fruits, see under section on Horticulture.)

Plants cultivated for fibre are :

Bœhmeria**Cotton**

Flax

Hemp

Hemp, Bowstring

Hemp, Manila

Hemp, Sisal

Hemp, Sunn

Henequen

Ramie

Tobacco is also an important agricultural crop. See article **TOBACCO**.

IV. The care of the growing crop is of sufficient importance to have separate treatment, and the study and treatment of plant diseases is a science by itself. The principal cause of plant diseases are bacteria and fungi, and almost every kind of crop has its specific insect pests. These are all described in separate articles following the articles on the crops, under such titles as **COTTON INSECTS**, **RICE INSECTS**, etc., and, therefore, need not be enumerated here. The general articles on plant diseases and their treatment, and on diseases common to several crops are:

Diseases of Plants

Fungicides

Insecticides

Insect Powder

Mildew

Blight

Botrytis

Canker

Chlorosis

Damping Off

Dry Rot

Ergot

Gummosis

Rust

Smuts

The special diseases which affect particular crops are treated in the ar-

ticles on the separate crops, but a few are described in separate articles. See:

Bunt

Cornstalk Disease

Crown-Gall

Ear Cockles

Clubroot

Oidium

Some of the common weeds with which the farmer and gardener have to contend are described in the articles:

Weed

Burdock

Chickweed

Chufa

Cockle

Chenopodium

Dodder

Orache

Pigweed

Tare

V. The raising of live-stock is the second great department of agriculture, and involves the selection of the animals, their breeding and general care, a supply of the proper feed stuffs; attention to diseases, which constitutes the practice of veterinary medicine; and the preparation of the animal products for the market.

The most important animals raised as live-stock are described in the articles:

Horse

Cattle

Mule

Sheep

Goat

Hog

Poultry

Fowl

Duck

Goose

Turkey

Pigeon

Bee

For the breeding and general care of the animals, see:

Breeds and Breeding

Incubator

Horseshoeing

Hoof

Dehorning

Feeding Farm Animals

Soiling, Soiling Crops

Bee-Keeping

Feeding stuffs may be divided into two general classes, natural or growing forage plants and the more or less artificially prepared feeds. The forage plants may again be divided into grasses and those that are not grasses, the latter being largely leguminous plants. See:

Feeding Stuffs

Pasture

Meadow

For forage grasses, see:

Grasses

Agropyron

Andropogon

Bermuda Grass

Blue Grass

Brome Grass

Buffalo-Grass

Canary-Grass

Crab-Grass

Gama Grass

Manna-Grass

Meadow Grass

Millet

Oat Grass

Orchard Grass .

Redtop Grass

Rye-Grass

Sorghum

Teosinte

Timothy Grass

The principal forage plants other than grasses are:

Alfalfa

Burnet

Chufa

Clover

Cowpea

Fescue

Lupine

Mangel-Wurzel

Medicago

Medick

Melilot

Rape

Sainfoin

Serradella

Soy Bean

Sulla

Trefoil

Vetch

For the most important prepared feeds, see:

Brewers' Grains

Gluten Meal

Cottonseed Meal

Hay

Linseed Meal

Malt Sprouts

Silage

Farm animals are subject to numerous serious diseases, and the investigation and treatment of these constitute the profession of veterinary medicine. A convenient subdivision of animal diseases is according to the kinds of animals which they affect, since, with a few exceptions, each disease is either peculiar to, or chiefly prevalent in, a particular species. Several of these given under cattle diseases, however,

may also affect horses or sheep, and vice versa.

(a) The general articles on the subject and those dealing with diseases common to several kinds of live-stock are:

- Veterinary Medicine
- Diseases of Animals
- Abortion
- Anthrax
- Colic in Animals
- Ring Worm
- Mange
- Tuberculosis (in animals)

(b) For diseases primarily affecting the horse, see:

- Azoturia
- Bighead
- Canker
- Curb
- Fistula
- Founder
- Glanders
- Heaves
- Hoof
- Influenza in Animals
- Meningitis
- Navicular Disease
- Roaring
- Strangles
- Stringhalt
- Spavin
- Thrush

(c) For diseases of cattle, see:

- Actinomycosis
- Blackleg
- Cattle Plague
- Fardel-bound
- Foot-and-Mouth Disease
- Joint-Ill
- Malignant Catarrh
- Mammitis
- Milk Fever

- Red Water
- Texas Fever

(d) For diseases of sheep, see:

- Agalactia
- Bloat
- Braxy
- Fardel-bound
- Gid
- Icterohæmaturia
- Liver-Rot
- Lung-Worms
- Nodular Disease

(e) For a disease of hogs, see:

- Hog Cholera

(f) For diseases of poultry and bees, see:

- Blackhead
- Gapes
- Roup
- Diarrhœa, White, of Chickens
- Foul Brood

VI. In the preparation of animal products for the market, one of the most elaborate, as well as important, departments is that of **Dairying**. This industry involves the supply of milk and cream, and the manufacture of butter and cheese. For a general article on the subject and articles on the processes of manufacture, and the machinery and equipment of the dairy, see:

- Dairying
- Milking Machine
- Aëerator
- Creamery
- Separator
- Butter-Making
- Churn
- Butter-Worker
- Butter-Color
- Cheese-Making

Cheese Factory

Rennet

For the principal dairy products,

see:

Milk

Skim Milk

Casein

Cream

Butter

Cheese

Buttermilk

Milk Sugar (under Sugars)

Ghee

Kephir

Koumiss

Whey

VII. Other more or less direct products of agriculture and stock raising, and the methods of their disposal, are described under:

Market and Marketing

Flour

Farina

Semolina

Food

Bread

Sugar

Honey

Glucose

Meat

Pork

Leather

Wool

See also **POULTRY** and **EGG** and the articles there referred to.

VIII. Since the patriarchal stage, Agriculture has been regarded as the most important of human industries, and is the one which has especially received direct and official attention from the governments of civilized nations. There are also at present numerous educational institutions, and private or semi-public associations for the advancement of the industry. See:

Agriculture, U. S. Department of

Agricultural Experiment Station

Agricultural Education

Farmers' Institute

Agricultural Association

Grange

IX. For biographies of eminent agriculturists, see:

Atwater, W. O.

Brewer, W. H.

Goodell, H. H.

Harris, J.

Hellriegel, H.

Hilgard, E. W.

Holdeffleiss, F. W.

Johnson, S. W.

Judd, O.

Lawes, J. B.

Maereker, M.

Morris, Daniel

Ruffin, F.

Thaer, A. D.

True, A. C.

Wallace, R.

Young, A.

B. Horticulture and Forestry

Horticulture is the art of producing plants which are valued for their agreeable properties rather than as necessities for human comfort. The horticultural methods of breeding,

propagating, and cultivating plants differ essentially from the agricultural method in that great attention is paid to the individual plant, while in agriculture attention is given to the crop

as a whole, in which the individual is lost. The subjects and products of horticulture are flowers, ornamental shrubs and trees, fruit trees, plants used as condiments, vegetables for the table, when considered merely as accessories to the more substantial articles of food, and all other plants treated by horticultural methods.

Horticulture also concerns itself with the laying out of gardens, and in this field of its activity it merges into landscape gardening and forestry. The latter, however, is a purely economic art and is not a branch of horticulture. It is included in this section because it is not yet a highly complex art and is, therefore, treated in a few general articles. For the general articles on Horticulture and Forestry, see:

- Horticulture
- Floriculture
- Landscape Gardening
- Arboriculture
- Forestry
- Afforestation

I. The buildings and equipments used by the horticulturist are described in the articles:

- Greenhouse
- Hothouse
- Conservatory
- Frame
- Espalier
- Hoe

One of the principal aims of horticulture is to develop particularly desirable varieties of plants and to maintain them true to the stock. For this purpose, special methods of breeding and propagation are necessary. See:

- Plant-Breeding

- Nursery
- Budding
- Cutting
- Grafting
- Layering
- Caprification

Special methods are also necessary in raising the young plants to maturity and securing the desired qualities in the matured product. See:

- Forcing
- Bottom Heat
- Electro-culture of Plants
- Pruning
- Cordon
- Blanching

For the most important plants cultivated in greenhouses, see:

- Greenhouse Plants
- Achimenes
- Azalea
- Banksia
- Carnation
- Chrysanthemum
- Fuchsia
- Gardenia
- Gladiolus
- Hyacinth
- Lily, Lily of the Valley
- Mignonette
- Oleander
- Passion-Flower
- Pelargonium

II. The principal articles on gardens, ornamental shrubs, and garden plants are:

- Lawn
- Hedge
- Ampelopsis
- Azalea
- Canna
- Centaurea
- Chrysanthemum

Convolvulus

Cosmos

Cotoneaster

Cowslip

Dahlia

Eschscholtzia

Heliotrope

Hibiscus

Hollyhock

Hyacinth

Hydrangea

Ivy

Jasmine

Jonquil

Laburnum

Larkspur

Laurustinus

Lavender

Libocedrus

Lilac

Lily

Lily of the Valley

Mignonette

Narcissus

Peony

Petunia

Phlox

Pink

Polyanthus

Poppy

Rose

Star of Bethlehem

Sunflower

Sweet Pea

Thrift

Tropæolum

Trumpet Flower

Tuberose

Tulip

Wallflower

Wistaria

Fruit, Cultivated

Orchard

Apple

Apricot

Banana

Blackberry

Butternut

Calville

Cherimoyer

Chestnut

Cranberry

Currant

Custard-Apple

Date

Dewberry

Earthnut

Fig

Gooseberry

Grape

Hazelnut

Huckleberry

Kumquat

Lemon

Lime

Litchi

Loquat

Mango

Melon

Mulberry

Muskmelon

Olive

Orange

Peach

Peanut

Pear

Persimmon

Pineapple

Plum

Pomegranate

Quince

Raspberry

Strawberry

Walnut

Watermelon

III. For the principal articles on fruit trees and fruit culture, see.

For table vegetables, see:

Vegetables
Herbs, Culinary
Salad Plants
Asparagus
Brussels Sprouts
Cabbage
Carrot
Cauliflower
Celery
Corn-Salad
Cress
Cucumber
Egg Plant
Endive
Garlic
Kale
Kohl-rabi
Leek
Lettuce
Mushroom
Onion
Parsley
Parsnip
Radish
Rhubarb
Salsify
Spinach
Squash
Tomato
Truffle
Turnip

V. For the principal plants cultivated for their flavoring qualities, see:

Flavoring Plants
Allspice
Almond
Capsicum
Caraway
Chicory
Chive
Cinnamon
Citron

Cloves
Fennel
Hop
Horseradish
Mace
Mustard
Nutmeg
Pepper
Pistacia
Thyme
Vanilla

VI. The section on horticulture should also include reference to the articles on the well known beverage plants, and on some of the more direct products of horticulture. See:

Coffee
Tea
Cacao
Wine
Cider
Prune
Raisins

VII. For biographies of eminent horticulturists and foresters, see:

Bailey, L. H.
Burbank, L.
Downing, A. J.
Downing, C.
Duhamel du Monceau
Henderson, P.
Hess, R.
Heyer, G.
Heyer, K. J.
Hovey, C. M.
Kenrick, W.
Koristka, K. von
Landreth, D.
Lodeman, E.
Longworth, N.
Loudon, J. C.
Lyon, T. T.
Manning, R.

See also **HORTICULTURAL SOCIETIES.**

Chapter 27. Zoology

EVERY topic of importance in Natural History, especially as represented in America, is contained in the pages of the *New International Encyclopædia*, which thus may justly be called a complete text-book of zoölogy. The outline of our knowledge of animal life thus furnished is supplemented, in respect to each part of it, by references to special books, museum collections, and other sources of knowledge where the student may find the minute details and investigations interesting and necessary to the specialist, but superfluous to a general reader. The material contained in the Encyclopædia is thus equally useful to the deep and to the superficial inquirer; for the specialist in one department of science needs to have at hand general information, at least, as to other departments.

Zoölogy has two aspects: (a) that of its observed facts; and (b) that of the principles involved: phenomena and deductions; condition and theory. The foremost or basic part is a knowledge of the facts of the animal world, namely: Form and Structure; Reproduction, Embryology and Growth; Habit; Instinct; Distribution, past and present; Relationship, of animals to one another, and to their environment. From these have been deduced the facts of the Classification and Evolution of forms.

STRUCTURE.

The reader who seeks to take the topics dealing with Form and Structure in order may read the following articles:

Biology
Morphology
Animal
Protoplasm
Cell
Amœba
Embryology
Anatomy
Bone
Skeleton; and the more particular accounts of its component parts, as SKULL, HAND, SHOULDER-JOINT, etc.
Muscular System
Circulatory System
Alimentary System
Excretory System
Respiratory System
Nervous System and Brain

Cephalization

Metamerism
Integument
Horn
Hoof
Nail
Teeth
Hair
Feather
Pterylosis
Scales
Pigment
Metachrosis
Chromatophore
Melanism
Touch
Taste
Smell
Eye
Ear

The structure of various animals, as characteristic of groups, is given in such general articles as:

Amblypoda

Ammonites
 Amphibia
 Annulata
 Arachnida
 Archæopteryx
 Bat
 Beetle
 Bird
 Bovidæ
 Butterflies and Moths
 Brachiopoda
 Camelidæ
 Canidæ
 Carnivora
 Cephalopoda
 Cestoda
 Chordata
 Cœlenterata
 Coral
 Crinoidea
 Crustacea
 Deer
 Dinosauria
 Dipnoi
 Echinodermata
 Elasmobranchii
 Electric Fish
 Felidæ
 Fish
 Fly
 Fringillidæ
 Frog
 Ganoidei
 Gastropoda
 Holothurian
 Horse, Evolution of the (under
 Horse, Fossil)
 Hydrozoa
 Hymenoptera
 Infusoria
 Insect
 Mammalia
 Marsupialia
 Medusa

Mollusca
 Ophiuroidea
 Prototheria
 Protozoa
 Pterodactyl
 Pteropoda
 Reptile
 Rodentia
 Sirenia
 Snake
 Turtle
 Ungulata
 Vertebrata

For the most part, the articles referred to contain, incidentally or cited in the appended Bibliography, the names of investigators identified with these particular subjects. In the great majority of cases the biography of each of these men is to be found in its alphabetical position in the *Encyclopædia*; and an earnest reader will turn to it, and so acquaint himself with the man by whose learning he is profiting.

REPRODUCTION AND GROWTH.

Animals continue to exist by reproducing their kind after various methods, and each individual passes through a more or less complicated series of changes from its beginning to its maturity, collectively known as its life-history, or autogeny. An orderly study of this essential phase of animal life may be conducted by reading the articles mentioned below, with the lesser ones indicated by cross-references:

Reproduction
 Spontaneous Generation
 Egg
 Spermatozoön
 Gemmule
 Sex
 Embryology

Fœtus
 Epigenesis
 Mitosis
 Parthenogenesis
 Alternation of Generations
 Biogenesis
 Cross-fertilization
 Metamorphosis
 Larva
 Pupa
 Metabolism
 Growth
 Regeneration
 Heredity
 Pangenesis
 Prepotency
 Telegency
 Mendel's Law
 Breeds and Breeding
 Hybridity
 Nidification

HABITS.

The habits of animals constitute the principal feature of what may be called Descriptive Zoology—that is, accounts of a species or a group of species placed under the vernacular name. This policy has been adopted, rather than that of putting descriptions under technical names, for greater convenience of reference, as well as to avoid that attitude of pedantry which made the earlier encyclopædias often ridiculous. The majority of readers would turn more naturally to HORSE than to “Equidæ” or to BLACKSNAKE than to “Zamenis.” The technical characteristics of many of the larger groups, lacking any English appellation, are given under their term in classification, as PROTOZOA, BOVIDÆ, and the like, or sometimes under the name of the special science dealing

with them, as ICHTHYOLOGY, ORNITHOLOGY. Habits of animals, then, may be learned from the descriptive articles generally, the principal of which are given below:

Agate Shell
 Agouti
 Albatross
 Alewife
 Alligator
 Anaconda
 Ani
 Ant
 Antelope
 Ant-lion
 Aoudad
 Apteryx
 Armadillo
 Ass
 Auk
 Aurochs
 Axolotl
 Aye-aye
 Baboon
 Badger
 Bandicoot
 Bank swallow
 Barn-owl
 Barn-swallow
 Bass
 Bat
 Bear
 Beaver
 Bedbug
 Bee
 Bighorn
 Bird of Paradise
 Bison
 Bittern
 Blackbird
 Blacksnake
 Bluebird
 Bluefish
 Boa

Bobolink	Crocodile
Bollworm	Crow
Bookworm	Cuckoo
Bot	Curlew
Bower-bird	Death Adder
Brant	Deathwatch
Buffalo-bird	Deer
Bug	Devilfish
Bulbul	Dingo
Bumblebee	Dodo
Bunting	Dog
Bushmaster	Dove
Bustard	Dragon-fly
Butterfish	Duck
Butterflies	Duckbill
Buzzard	Dugong
Caddis-fly	Duiker
Camel	Eagle
Capercaillie	Earthworm
Capybara	Eel
Caribou	Eider
Carp	Elephant
Carpenter Bee	Electric Fish
Cat	Ermine
Cattle	Falcon
Cave Animals	Fer-de-lance
Cavy	Firefly
Chameleon	Fish-hawk
Chamois	Flamingo
Chinch-bug	Flea
Cicada	Flesh-fly
Civet	Fly
Clam	Fly-catcher
Clothes-moth	Flying Squirrel
Cockatoo	Fox
Cockroach	Frog
Cod	Gall-insects
Conch	Gannet
Condor	Garefowl
Copperhead	Gazelle
Cowbird	Gibbon
Coyote	Gipsy Moth
Crab	Giraffe
Cricket	Gnat

Goat	Lamprey
Goldfinch	Land Tortoise
Goose	Leech
Gopher	Lemming
Gorilla	Lemur
Goshawk	Leopard
Grayling	Lion
Grebe	Lizard
Grouse	Llama
Guanaco	Lobster
Gull	Lory
Halibut	Louse
Hare	Lungfish
Hawk	Mackerel
Hedgehog	Mallard
Hermit Crab	Mammalia
Heron	Mammoth
Herring	Manatee
Hessian Fly	Man-eater Shark
Hippopotamus	Marsh Hawk
Hognose	Marten
Hook-worm	Maskinonge
Hornbill	Mastodon
Horse	Menhaden
Hound	Mole
House-fly	Mollusk
Humming-bird	Monkey
Hyena	Moose
Ibex	Mosquito
Ibis	Moth
Iguana	Mouse
Jackal	Mule Deer
Jackdaw	Mungoos
Jaguar	Musk Ox
Jay	Muskrat
Jelly-fish	Narwhal
Jungle Fowl	Nest
Kangaroo	Nightingale
Katydid	Nightjar
King-bird	Nurse-frog
Kingfish	Nutria
Kingfisher	Opossum
Kraken	Orang-utan
Lace-bug	Oriole

Ostrich	Sardine
Otter	Sawfish
Owl	Scale Insect
Oyster	Scorpion
Palolo Worm	Sea-anemone
Parrakeet	Sea-bass
Parrot	Sea-horse
Partridge	Seal
Peacock	Sea-otter
Pheasant	Sea-urchin
Pigeon	Shark
Pipa	Sheep
Pipefish	Sheepshead
Plant-bug	Shore-birds
Plover	Shrew
Polecat	Shrike
Pompano	Shrimp
Porcupine	Silkworm
Porpoise	Skunk
Potato Insects	Skylark
Prairie Dog	Sloth
Ptarmigan	Smelt
Puma	Snail
Python	Snake
Quagga	Snipe
Quail	Spaniel
Quinnat Salmon	Sparrow
Rabbit	Spider
Raccoon	Sponge
Rail	Sporozoa
Rat	Squid
Rattlesnake	Squirrel
Raven	Starfish
Ray	Stickleback
Rhinoceros	Stork
Road-runner	Sturgeon
Robin	Sunfish
Rocky Mountain White Goat	Swallow
Roe Deer	Swan
Rook	Swift
Sable	Swine
Salamander	Tailor-bird
Salmon	Tanager
Sandpiper	Tapeworm

Tapir
Tarantula
Tautog
Termite
Terrapin
Terrier
Thread-worms
Thrush
Tick
Tiger
Tiger-hunting
Tilefish
Titmouse
Toad
Toucan
Tree-frog
Trogon
Trout
Tsetse-fly
Turbot
Turkey
Turtle
Umbrella-bird
Vampire
Veery
Viper
Vireo
Viscacha
Vulture
Walrus
Wapiti
Warbler
Wasp
Watersnake
Water-spider
Water-thrush
Wax-insect
Weakfish
Weasel
Weaver-bird
Weevil
Whale
Whippoorwill
Wildcat

Wolf
Woodpecker
Wood-rat
Worm
Wren
Yak
Zebra

MIND IN ANIMALS.

The intelligence and mental processes of animals are subjects to which much attention has been paid recently, and facts bearing upon them are eagerly sought. Some of the conclusions of students will be found in the following:

Ant
Nervous System, Evolution of the
Habit
Instinct

Social Insects (under Insect)
Orientation

DISTRIBUTION OF ANIMALS.

Everyone is aware that different parts of the earth's surface have different faunas, and that this condition apparently remains permanent, except when, by means of civilization or commerce, certain animals are enabled to spread beyond their natural habitat, and even become cosmopolitan, as have rats, house-mice, the European house-sparrow, and a large number of plant-feeding insects. Normally one fauna does not enlarge or diminish at the expense of another, and, for the most part, species of animals, as of plants, are restricted to a comparatively small range and set of climatic conditions. The local faunas, both on the land and in the sea, have been examined, and their boundaries well ascertained. It has been found, however, that groups of related faunas

exist side by side, which may be composed into large divisions called "sub-regions," and these into a few still larger ones called "regions." The natural barriers which are set to the dispersion of animals, and the finding of the actual boundaries of the faunal districts, form the outlines of the highly interesting study of the geographical distribution of animal life, past and present. To acquaint himself with this science, the reader should peruse the following co-related articles:

- Distribution of Animals
- Fauna
- Ethiopian Region
- Paleotropical Region
- Holarctic Region
- Nearctic Region
- Oriental Region
- Palearctic Region
- Deep-sea Exploration
- Pelagic Animals
- Plankton

See also the names of the various subregions, as NEW ZEALAND SUBREGION, MALAGASY SUBREGION, etc.; the paragraphs on *Fauna* under the names of the various continents and countries, as AMERICA, AUSTRALIA, BRAZIL, and the like; and, for the distribution of animals in past ages, PALEONTOLOGY, EXTINCTION OF SPECIES and MIGRATION OF ANIMALS.

RELATIONSHIP.

The relationship of animals toward others, and to the environment of each individual, species, or group, forms a feature of far-reaching importance and of great interest in zoology, and the study of the facts involved has been set apart as a science under the name of BIONOMICS. Much relating to it

will be found in the descriptive articles cited under *Habits* and elsewhere, but special consideration is given under the succeeding heads:

- Bionomics
- Cave Animals
- Environment
- Estivation
- Flowers and Insects
- Hibernation
- Social Insects (under *Insect*)
- Natural Selection
- Orientation
- Parasite
- Symbiosis
- Tropism

The relations between man and the lower animals are mainly those of warfare or service. Animals are in the way of his operations or dangerous to him, and must be got rid of, or supply him with flesh, or hide, or fur, or some other desirable thing, which can be obtained, in most cases, only by killing them; or they attract him to the chase and to such sports as angling and shooting. Hence, many are sought only to be killed, and some species have been entirely exterminated. On the other hand, his agricultural operations have encouraged the spread and development of some, as various insects, rats, etc., in a remarkable way. A third class has been utilized by domestication and turned to his service and benefit. Some articles of special moment in the *Encyclopædia* dealing with this sporting and economic aspect of natural history are these:

- Acclimatization
- Angling
- Bee
- Buffalo

Domestic Animals (and the various kinds, as Camel, Cat, Dog, Horse, Sheep, Fowl, etc.)

Extinct Animals

Falconry

Fish as Food

Fish Culture

Fisheries

Fishing

Fur and the Fur Trade

Game Laws

Game Preserve

Insects, Propagation of Disease by

Introduced Species (especially of injurious insects, such as those described under Bollworm, Cutworm, Chinch-bug, Pear Insects, etc.)

Mosquito

Oyster

Pearl

Prairie Dog

Rabbit

Seal

Silkworm

Taxidermy

METHODS OF STUDY.

The methods of study in natural history are described to some extent in the articles:

Deep-sea Exploration

Laboratory

Microscope

Morphology

Nature-Study

Psychological Apparatus

Zoölogical Garden

Zoölogical Station

CLASSIFICATION OF ANIMALS.

Turning now from the methods and facts of observation and experiment to the philosophical deductions,—the principles and theories drawn from these

facts,—the reader will first need to attend to the subject of classification, which has been slowly developed through a long series of errors and limitations and gradually corrected in the brightening light of growing knowledge. The history of this search for the true, because natural, classification may be found in the articles ANATOMY, CLASSIFICATION OF ANIMALS, and ZOÖLOGY, with the names of the men who from time to time notably advanced taxonomy, and whose biographies may be read. No real success was achieved until the modern conviction was arrived at, that the key to the problem of classification was to be found in community of descent, and that any true classification must follow the perception of genetic relationship—descent from a common ancestor. This is the basis of modern classification, and what we have approaches perfection in just the degree that the phylogeny of each group is rightly apprehended. As a result of the constant increase of knowledge, the arrangement of this group and that is constantly being modified and presumably always improved. From time to time, these amendments are gathered up and critically combined into a general scheme. The latest such scheme of classification of the whole animal kingdom, which is authoritative and at the same time generally accessible, is that contained in Parker and Haskell's *Text-book of Zoölogy*, and this has been followed in respect to the general outline in this Encyclopædia, insuring uniformity. For further details, consult:

Classification of Animals

Phylogeny

Variation**Type****Zoology**

For the classification of separate groups, see their titles, as CœLENTERATA, CRUSTACEA, MOLLUSCA, ECHINODERMATA, etc.

ZOÖLOGY AND EVOLUTION.

The philosophical part of zoology has been developed since man began to observe the ways of nature, and has produced a vast body of "laws," doctrine, and speculation, the history of which is sketched in such general articles as ANATOMY, ZOÖLOGY, EVOLUTION, etc., and the biographies of the great thinkers cited should be read in connection with their themes. Science has constantly tended to separate itself from metaphysics, and to use its hypothesis merely as a means for further investigation of phenomena. The outcome has been the formulation and general acceptance of a theory of universal development from the simple to the complex, from the homogeneous to the specialized; and Organic Evolution or the Doctrine of Descent is the application of the general principle to the history and phenomena of living things. A reader who wishes to acquire a knowledge of these views of nature may do so by reading in consecutive order the articles named below:

Biology**Evolution****Ontogeny****Phylogeny****Natural Selection****Lamarckism****Growth****Heredity****Hybridity****Mendel's Law****Extinction of Species**

Guided by these articles and the cross-references to be found in them, he may pursue the subject under other fruitful titles, such as:

Botany**Chromosomes****Cross-fertilization****Degeneration as a Factor in Evolution****Embryology****Environment****Flowers and Insects****Isolation****Kinetogenesis****Longevity****Mechanics of Development****Mimicry****Neo-Darwinism****Neo-Lamarckism****Otter Sheep****Pollination****Polymorphism****Protective Coloration****Recognition Marks****Regeneration****Reversion****Senescence****Sex****Sexual Selection****Use-Inheritance****Variation****Warning Coloration****Weismannism****BIOGRAPHY.**

Only a name or two has been quoted in the preceding analysis of the science of zoology. The investigators in the field have been numerous, and the following list should be regarded as selected rather than complete. See:

Agassiz, L.

- Audubon, J. J.
Baer, K. E.
Baird, S. F.
Balfour, F. M.
Barry, M.
Bates, H. W.
Beecher, C. E.
Bennett, J. H.
Bichat, M. F. X.
Blumenbach, J. F.
Bory de Saint Vincent, J. B.
Burbank, L.
Burmeister, H.
Camper, P.
Carus, K. G.
Castelnau, F.
Clark, H. J.
Cope, E. D.
Coste, J. V.
Cuvier, G. L. C.
Dana, J. D.
Darwin, C.
Davenport, C. B.
Degeer, K.
Dohrn, A.
Du Bois-Reymond, E. H.
Dujardin, F.
Eimer, T.
Eschscholtz, J. F.
Fleming, J.
Flourens, M. J. P.
Forel, A.
Galton, F.
Gay, C.
Gegenbaur, K.
Geoffroy Saint-Hilaire, E.
Gesner, K.
Goode, G. B.
Gould, A. A.
Gould, J.
Graaf, R. de
Green, S.
Haeckel, E.
Haller, A.
Harvey, W.
Hertwig, O.
Hertwig, R.
Huber, F.
Humboldt, A.
Hunter, J.
Huxley, T. H.
Hyatt, A.
Jordan, D. S.
Kölliker, A.
Lamarck, J. B.
Lang, A.
Lankester, E. R.
Le Conte, L.
Le Conte, J. E.
Le Conte, J. L.
Leeuwenhoek, A.
Leidy, J.
Lesueur, C. A.
Leuckart, R.
Levaillant, F.
Leydig, F.
Linnæus, C.
Loeb, J.
Lubbock, J.
Lyonnet, P.
Malpighi, M.
Marsh, O. C.
Mendel, G. J.
Mivart, St. George
Müller, J.
Müller, J. F. T.
Orbigny, A. D. d'
Osborn, H. F.
Owen, Richard
Packard, A. S.
Pallas, P. S.
Perty, J. A. M.
Ray, J.
Réaumur, R. A. F.
Reimarus, H. S.
Romanes, G. J.
Ross, A. M.
Roux, W.

Schleiden, M. J.
Schultze, M. S.
Schwann, T.
Sedgwick, W. T.
Semper, K.
Siebold, K. T. E.
Spallanzani, L.
Spencer, H.

Swammerdam, J.
Tschudi, J. J.
Vries, H. de
Wagner, M.
Wallace, A. R.
Weismann, A.
Wilson, A.
Wyman, J.

28. Manufactures and Engineering

THE development of manufacturing industries has resulted from more efficient economic organization, and from the perfection of technological processes involving the application of scientific discoveries and knowledge. Accordingly, the most profitable method of study is first to consider the development of manufactures in general from the economic standpoint, and especially of the Factory System, where concentration permits of manufacture in increased quantities at diminished expense. This will be found treated in the articles on **FACTORIES** and **MACHINERY**, **ECONOMIC EFFECTS OF**, in which is traced the growth of manufacturing in general. For specific industries, reference should be made to the separate articles, as the historical and statistical development of any given industry is best considered by itself, on account of the important relation that it bears to practical questions of material, processes, and the like. This brings us straightway to the leading question how things are made, which it is an important function of an encyclopædia to answer. In this is involved the gathering and preparation of the raw material, the manufacture, the finishing, and the distribution, or utilization, of the finished product. There are prepared below a number of lists of subjects, more or less cognate, dealing with manufacturing industries and their products, and, by carefully observing the cross-references, a complete idea of the more important processes may be gained.

A. Manufacturing Processes

FOOD AND MANUFACTURE OF FOOD STUFFS, ETC.

An important field of manufacturing operations is that concerned with the preparation of food stuffs, both in the factory and on a less extensive scale in the home. **COOKERY**; **FOOD, PRESERVATION OF**; **SLAUGHTER HOUSES**; and **PACKING INDUSTRY** are titles that suggest the wide range of subjects that may be grouped under such a head. The following list indicates appropriate titles:

Meat
Slaughter Houses
Packing Industry
Food, Preservation of
Digester

Extract of Meat
Ham
Lard
Tallow
Pemican
Jerked Beef
Cookery
Wheat
Flour
Baking
Bread
Biscuit
Baking Powder
Butter
Cheese
Guarana
Macaroni
Sugar
Sardine

Gelatin
Confectionery
Chocolate
Cocoa Butter
Chewing Gum
Macaroon
Condiments
Pickles
Chutnee
Curry Powder
Olive Oil

FERMENTED AND DISTILLED LIQUORS.

The manufacture of BEER, WINE, and LIQUORS involves many interesting processes in chemical technology. A convenient beginning may be made by considering the history of fermented and distilled liquors, and the extent to which they are manufactured and consumed. Then, taking up the general properties of beer, wine, and distilled liquors, a classification of these beverages can be made, and the essential features of their production learned. Further details appropriate to the manufacture are discussed under BREWING, STILL, BOTTLING AND BOTTLING MACHINERY, while questions involving the chemistry of the subject are treated under FERMENTATION, DISTILLATION, and ALCOHOL. The physiological effects of alcohol are not only interesting, but instructive, and are properly considered in connection with the manufacture of alcoholic beverages. For a comprehensive study of the whole subject, the following articles should be consulted:

Liquors, Fermented and Distilled,
Statistics and History of
Alcohol
Alcoholometry
Hydrometer

Alcohol, Physiological and Poisonous Action of
Fermentation
Brewing
Beer
Wine
Currant Wine
Distilled Liquors, or Ardent Spirits
Distillation
Brandy
Apple Brandy
Rum
Whisky
Fusel Oil
Geneva
Gin
Liqueur
Absinthe
Benedictine
Chartreuse
Curaçoa
Kirsch
Kümmel
Maraschino
Ratafia
Noyau
Bishop
Cider
Berlin Spirit
Bottling and Bottling Machinery

FIBRES AND TEXTILES.

The subject of fibres and textiles is one of novel scope and, for its proper comprehension, requires first the consideration of the fibres themselves and how they are produced and prepared for manufacture. The chief vegetable fibres are;

Cotton
Flax
Hemp
Jute
Linen
Hemp, Manila

Ramie
Coir
Cotton, Artificial
Wood Pulp Yarns
Silk
Silk Worm
Floss Silk
Organzine
Wool
Wool and Worsted Manufactures
Sheep
Noils
Shoddy

It is next advisable to consider the processes by which the fibres are prepared for spinning and weaving. These processes are discussed in the following articles:

Cotton-Gin
Heckle
Carding
Spinning
Yarn

Textile manufacturing comprises industries of many diverse characters, which employ complicated machinery. As they have a certain amount of similarity, and bear some relation to each other, the processes of making the various fabrics may first be considered together. The first step is the designing of the fabric, in which the weaves, patterns, and designs are made on the Loom. This naturally involves the discussion of WEAVING, which should explain the fundamental weaves and the methods by which patterns are produced. Therefore, in this connection, the following articles should be consulted:

Textile Manufacturing
Textile Designing
Weaving
Loom

Heddle
Bobbin

Crocheting and knitting differ essentially from weaving and, whether performed by hand or machine, are the means of producing garments and other useful articles. The following titles indicate the articles to be consulted on these subjects:

Crochet
Knitting
Hosiery

Either the yarn or the finished fabric may be dyed, or the latter may be printed, in order to impart colored designs to it. In either case, complex and interesting processes are involved, which are described in the list below:

Dyeing
Coal-Tar Colors
Vegetable Colors
Indigo
Turkey Red
Textile Printing
Beetling
Calendering
Bleaching
Bleaching-Powder
Embroidery

The finished textile fabrics are almost infinite in their variety. It is possible to select the more important and the representatives of the leading classes and study them in detail. Such a list arranged alphabetically is as follows:

Art Square
Bandana
Barege
Batiste
Blanket
Bobbinet

Bolting-Cloth
 Bombazine
 Brocade
 Brocatel
 Brussels Lace
 Buckram
 Bunting
 Cambric
 Camel's Hair
 Camlet
 Canvas
 Carpet
 Cassimere
 Chenille
 Chintz
 Corduroy
 Crape
 Cretonne
 Crinoline
 Damask
 Diaper
 Dimity
 Dornick
 Drugget
 Duck
 Felt
 Flannel
 Floor-Cloth
 Fustian
 Galloon
 Gauze
 Gingham
 Grass Cloth
 Gunny
 Haircloth
 Huckaback
 Kersey
 Lace
 Linen
 Matting
 Mercerized Cotton
 Mohair
 Moire
 Moleskin

Muslin
 Nankeen Cloth
 Nets
 Oilcloth
 Piña Cloth
 Plush
 Poplin
 Rugs
 Satin
 Silk
 Taffeta
 Tapestry
 Tarlatan
 Tweed
 Velvet

LEATHER AND LEATHER MANUFACTURES.

The various processes for the manufacture of LEATHER are described under that title, and the finished products, such as boots, shoes, saddlery, etc., in which independent industries participate, are appropriately grouped by themselves. For leather and leather goods, the following list is recommended:

Leather
 Bark
 Tanning (under Leather)
 Buckskin
 Glove
 Buff Leather
 Cordovan
 Shagreen
 Chamois
 Leather Cloth
 Saddlery
 Boot
 Shoes
 Blacking

CARRIAGES AND OTHER VEHICLES.

From the primitive ox-cart to the

modern motor vehicle in its numerous forms for business and pleasure is a long step, and it includes the development of many vehicles that have wrought important economic and social changes, involving new and improved road construction. These are represented in the following list:

- Cart
- Chariot
- Carriage
- Coach
- Driving
- Coupé
- Hansom Cab
- Wagonette
- Buckboard
- Phaeton
- Ambulance
- Bicycle
- Automobile
- Motor Vehicle
- Motor Cycle
- Side Car

CERAMIC INDUSTRIES.

Clay affords the fundamental material for numerous products used in industry and also for works of art. From its geology to its decorative application many interesting processes are involved, and the reader will find the subject well covered in the *NEW INTERNATIONAL ENCYCLOPAEDIA*. It is recommended that at the outset the article *CLAY* be studied, followed by those on the accompanying list which discuss rather the industrial uses as somewhat distinct from the mere artistic, as contained in the next following section:

- Clay
- Kaolin
- Kiln

- Fire Brick
- Fire Clay
- Pipe Clay
- Pottery
- Tile
- Terra Cotta
- Fireproof Construction

PORCELAIN AND POTTERY.

There are few more interesting studies than that of porcelain and pottery, and, if the processes are traced from the production of the clay until the finished piece emerges from the kiln after the final firing, the reader will be well repaid. For this purpose the following articles are recommended:

- Pottery
- Porcelain
- Biscuit
- Kiln
- Annealing
- Ceramic
- Enamel
- Bow China
- Burmese Ware
- Vase
- Cracklin
- Stoneware (under Delft)
- Delft Ware
- Eggshell China
- Faience
- Jasper Ware
- Majolica
- Terra Cotta
- Tile
- Pyrometer

GLASS.

Few materials are more extensively employed in the arts than glass, and in scientific work and in decoration it also holds an important place. For the es-

sential features of its manufacture, the comprehensive and general article **GLASS** should be consulted, while the subordinate topics, as listed below, should be read in this connection:

Glass
 Flint Glass
 Crown Glass
 Iridescent Glass
 Water-Glass
 Wire Glass (under Glass)
 Bottle
 Carboy
 Prince Rupert's Drops
 Bologna Vial
 Lens
 Mirror
 Lorraine Glass
 Stained Glass
 Gems, Imitation

HOROLOGY.

The construction of various instruments for keeping time is a science of considerable antiquity, and its various departments may be studied with profit. A convenient arrangement of titles is given below:

Horology
 Clock
 Watch
 Clepsydra
 Dial
 Hour-Glass
 Balance
 Escapement
 Fusee
 Pendulum
 Isochronism
 Chronoscope
 Chronograph
 Time, Standard
 Time Signals

PRINTING, TYPOGRAPHY, ENGRAVING, PAPER, ETC.

The development of the art of printing has brought about many connected processes and industries. These are concerned with the impression on paper of letters or designs in one form or another, or the provision of the apparatus and machinery to do this, as well as the material to receive the impression. An arrangement of such subjects is as follows:

Printing
 Case
 Type Founding
 Typesetting Machines
 Electrotyping (under Electro-Chemistry, Industrial)
 Bank Notes, Manufacture of
 Engraving
 Photo-Engraving
 Three-Color Process
 Lithography
 Rotogravure
 Ink
 India Ink
 Graphotype
 Paper
 Parchment
 Parchment, Vegetable
 Cardboard
 Bristol Board
 Cartridge-Paper
 Calendering
 Bookbinding
 Envelope
 Pen
 Fountain Pen (under Pen)
 Pencil
 Typewriters
 Copying Machines
 Sealing-Wax
 Ruling Machine

MISCELLANEOUS INDUSTRIES AND PRODUCTS.

Bead
 Bell
 Blacking
 Bristles
 Brush and Broom
 Button
 Candle
 Celluloid
 Coal-Tar
 Coke
 Comb
 Cooperage
 Cork
 Corset
 Cosmetics
 Doll
 Embossing
 Excelsior
 Fan
 Flowers, Artificial
 Gems, Imitation and Artificial
 Gilding
 Gimp
 Glove
 Glue
 Gold Lace
 Grease
 Gutta-Percha
 Ivory
 Ivory, Vegetable
 Japanning
 Jewelry
 Lac
 Lacquer-Work
 Lapidary Work
 Laundry Machinery
 Linoleum
 Lumber Industry
 Mangle
 Matches
 Needle
 Ormolu

Papier-Maché
 Pen
 Pencil
 Perfumery
 Petrolatum
 Pin
 Poppy-seed Oil
 Pyrotechny
 Rope
 Rubber
 Sawdust
 Sewing Machine
 Silkworm Gut
 Straw Manufactures
 Tableware, Silver-Plated
 Tobacco Pipe
 Vacuum Cleaners
 Varnish
 Voting Machine

MINING AND METALLURGY.

In addition to general articles on **MINING** and **METALLURGY**, there will be found, under the various metals, articles dealing not only with their occurrence and general properties, but also with their mining and metallurgy. Such articles are included in the following list :

Mining
 Metallurgy
 Iron and Steel
 Copper
 Gold
 Silver
 Nickel
 Zinc
 Platinum
 Lead
 Tin
 Antimony
 Manganese
 Mercury
 Aluminium

Cobalt
Molybdenum
Litanium
Tungsten
Uranium
Vanadium

Looking, however, at special methods of mining and metallurgy, there are general articles which have reference to the more common metals and the methods of producing and refining them. These articles are as follows:

Mining
Mines and Mining in Law
Blasting
Explosives
Mine Accidents
Assaying
Metallurgy
Metallography
Calcining
Crucible
Ore Dressing
Roasting
Chloridizing
Chlorination
Refining of Metals
Electro-Chemistry
Electric Furnace

Although considerable material on metal working is given under the metals themselves, there are certain processes which can be described in special articles. These include the following:

Founding
Forge, Forging
Anvil
Welding
Tempering Steel
Annealing
Dies and Die-Sinking

Damaskeening
Brazing
Rolling Mill
Grinding and Crushing Machinery
Mint
Draw-Plate
Electro-Plating
Metal-Working Machinery

For many purposes, alloys are more useful than simple metals. These are discussed under their own heads, as well as in a collective article, while other preparations of metal, as GALVANIZED IRON and STEEL WOOL are also treated. A list of such articles is as follows:

Alloy
Alloys Magnetic
Brass
Bronze
Babbitt Metal
Fusible Metal
Coinage
Pinchbeck
Solder
Flux
Galvanized Iron
Steel Wool

The ornamental working of metals into small objects is also to be considered, and there are a number of articles which treat the subject from the artistic as well as the practical side. These titles include:

Jewelry
Plate, Sheffield
Tableware, Silver-Plated
Gold-Beating
Gold-Beater's Skin
Repousée
Enamel
Embossing

B. Construction

BUILDING AND BUILDING MATERIALS.

The materials used in building embrace natural and artificial substances which are specially wrought for the purpose. Whether we start with the lumber from the forest or the stone of the quarry, we find that there are a number of processes which have to be gone through before the material is finally disposed of in its appointed place. Considering first the materials for building, together with their sources, the following list has been constructed:

- Building-Stone
- Quarry, Quarrying
- Stone Cutting and Dressing
- Stone, Artificial
- Clay
- Brick
- Mortar
- Kiln
- Cement
- Concrete
- Terra Cotta
- Tile
- Gypsum
- Lumber Industry
- Factor of Safety
- Strength of Materials

For a study of the process of BUILDING, the article under that title will furnish an adequate idea. The separate branches, however, require more extensive treatment, as the following topics will suggest:

- Building
- Carpentry
- Cabinet Work
- Foundation

- Masonry
- Brick Work
- Fireproof Construction
- Steel Skeleton Construction
- Half Timber
- Plaster, Lathing and Plastering
- Heating and Ventilation
- Plumbing
- Elevator
- Paper-Hangings
- Painting
- Illumination
- Gas, Illuminating and Fuel
- Electric Lighting

For certain forms of building, such as APARTMENT HOUSES and HOTELS, somewhat different equipment is required, and these are discussed under their own heads. For building operations in general, there are a number of minor topics that require a separate treatment. These may be included in the following list:

- Centring
- Chimney
- Door
- Window
- Framing
- Column
- Girder
- Beam
- Brace
- Roof
- Gutter
- Lightning, Protection from
- Lock
- Alarm
- Fire-Escape
- Calcimine
- Heating and Ventilation

C. Engineering

The constantly broadening field of engineering endeavor has resulted in dividing the work, so that to-day an engineer adopts but a comparatively small field for his own activity. Under **ENGINEER AND ENGINEERING** will be found a description of the modern divisions of engineering work and the qualifications of the men that follow each branch. In civil engineering, first may be mentioned the surveyor.

SURVEYOR.

Surveying involves the measurement of distances and areas and the delineation of the territory examined. It is carried on in different ways, depending on the extent and character of the country under survey. The following shows the general division of topics:

- Surveying
- Coast and Geodetic Survey
- Geological Survey
- Geodesy
- Triangulation
- Isostasy
- Deflection of the Plumb Line
- Hydrography
- Dredge
- Sound, Sounding
- Photographic Surveying
- Altimetry
- Hypsometry
- Leveling
- Offset
- Map
- Engineering Instruments
- Theodolite
- Plane-Table
- Stadia
- Telemeter
- Vernier

- Sextant
- Compass, Solar
- Planimeter
- Range-Finder
- Aneroid
- Heliograph
- Odometer

RAILWAYS.

After a general and comprehensive review of the subject of **RAILWAYS** in the article of that title, particular parts require somewhat fuller treatment, involving, as they do, engineering and other features of a unique character. For this purpose, the following list is supplied:

- Railways
- Street Railway
- Urban Railways
- Electric Railways
- Ship Railway
- Locomotive
- Compressed-Air Locomotive
- Tunnel
- Bridge
- Cantilever
- Viaduct
- Culvert
- Gauge
- Frog, Railway
- Fish Plate
- Block-Signal System
- Air Brake
- Buffer, Buffing Apparatus
- Bumping Posts
- Snow-Plow

RIVER AND HARBOR IMPROVEMENTS.

Various important works to aid maritime commerce consist in the erection of numerous harbor and river im-

provements. These are of a permanent character and require special engineering. Such works are described in the list below:

- Lighthouse
- Buoy
- Jetty
- Breakwater
- Embankments
- Cofferdam
- Foundation
- Dike
- Harbor
- Dredge
- Levee
- Dock
- Pile
- Excavating Machinery
- Blasting
- Caisson
- Masonry
- Retaining Walls
- Quay

CANALS.

When canals are carried across an isthmus, as at Suez or Panama, they may involve also many of the essential characteristics of harbor improvements; yet such works show considerable variation, and, when ordinary inland canals or those in connection with an irrigation system are considered, the methods of construction are quite different. The following list suggests a line of topics that could with profit be consulted:

- Canal
- Irrigation
- Panama Canal
- Nicaragua Canal
- Suez Canal
- Corinth Canal
- Erie Canal

- New York State Barge Canal
- Cape Cod Canal
- Saint Mary's Canal
- Welland Canal
- Chicago Drainage Canal
- Trans-Isthmian Canal
- Ship Railway

WATERWORKS AND HYDRAULIC ENGINEERING.

The use of water practically involves a separate department of engineering, but one in contact at many points with civil, sanitary, mechanical, and electrical engineering. It is necessary first to consider WATER SUPPLY, or the sources of water, then its storage, transmission, purification, distribution, and final consumption, and also various devices that are employed in these different stages. The material on this subject in the *New International Encyclopædia* is represented in the following list:

- Water Supply
- Hydrography
- Well-Sinking
- Artesian Wells
- Dams and Reservoirs
- Hydrostatics
- Hydrodynamics
- Current-Meter
- Weir
- Irrigation
- Pipe
- Water Purification
- Water-Works
- Fire Protection
- Pumps and Pumping Machinery
- Valve
- Water Power
- Filter and Filtration
- Accumulators
- Hydraulic Ram
- Water Wheel and Turbines

Hydraulic Press
 Archimedes' Screw
 Danaide
 Hydraulic Pressure Engine
 Water Meters
 Hydraulic Elevator (under Elevator)

SANITARY SCIENCE.

Under this somewhat comprehensive title, may be included such schemes as tend to improve and safeguard the health of mankind. See:

Hygiene
 Diet
 Occupational Diseases
 Schools, Medical Inspection of
 Health, Boards of
 Sanitary Commission
 Sanitary Laws
 Quarantine
 Water Supply
 Water-Works
 Water Purification
 Plumbing
 Garbage and Refuse Disposal
 Sewage Disposal
 Sewerage
 Disinfectants
 Drainage
 Catch-Drains
 Heating and Ventilation
 Bath-Houses, Municipal
 Slaughter Houses
 Burial
 Cemetery
 Cremation of the Dead
 Health Association, American Public

MUNICIPAL ENGINEERING.

The various applications of engineering knowledge to a large city result in the solving of many problems, such as water supply, transportation, the

provision of PARKS and PLAYGROUNDS for the masses, etc., and especially the fundamental ones involved in CITY PLANNING, which are now engrossing the attention of many American cities. These subjects, grouped from this point of view, will be found in the following list:

City Planning
 Road
 Street
 Boulevard
 Road and Street Machinery
 Asphalt
 Pavement
 Subways
 Electric Railways
 Street Railways
 Urban Transportation
 Water-Works
 Illumination
 Electric Lighting
 Parks and Playgrounds
 Landscape Gardening
 Recreation Piers
 Bath-Houses, Municipal
 Garbage and Refuse Disposal
 Municipal Ownership
 Public Utilities

See also preceding section on Sanitary Science.

FIRE PROTECTION.

The surest fire protection is FIRE-PROOF CONSTRUCTION for buildings, seen at its best in STEEL SKELETON CONSTRUCTION, where combustible material is reduced to a minimum. Then there are SAFES and SAFE DEPOSIT VAULTS for valuables, and the use of INCOMBUSTIBLE FABRICS. When these safeguards are unavailing, however, recourse must be had to the various apparatus for fighting fire, such as the

FIRE-ENGINE, now seen in its self-propelled form, the motor fire-engine, the high pressure pumping service, the **FIRE-EXTINGUISHER**, etc. See:

Fireproof Construction
Safes and Safe Deposit Vaults
Fireproofing
Incombustible Fabrics
Fire-Alarm
Fire Protection, Municipal
Fire-Engine
Fire-Extinguisher

MECHANICAL ENGINEERING.

For raising and transporting materials, and for carrying on other important operations, many interesting mechanical devices are constructed. The **CABLEWAY**, **TELPHERAGE**, **DERRICK**, and **TRAVELING SIDEWALK** are typical of the former class, while **GRINDING AND CRUSHING MACHINERY** and **AIR COMPRESSOR** may be cited as divisions of the many branches of mechanical engineering. A list of such subjects as are not already cited under other heads includes:

Derrick
Crane
Cableway
Telpherage
Ropeway
Traveling Sidewalk
Elevator
Air Compressor
Blowing-Machines
Pneumatic Dispatch
Power, Transmission of
Dynamometer
Brake
Prony Brake
Air Brake
Lubricants
Wood-Working Machinery

MECHANICAL DEVICES.

In the construction of machinery there are certain elementary parts that enter into its design. These serve such purposes as changing the direction of a motion, increasing or reducing speed, or permitting its control in any desired way. See:

Mechanical Powers
Axle
Shafting
Wheel and Axle
Lever
Pulley
Crank
Cam
Eccentric
Winch
Windlass
Inclined Plane
Wedge
Toggle Joint
Screw
Endless Screw
Belt
Gear-Wheel
Gearing
Couple

PRIME MOVERS.

For the generation of power there are a number of sources to be considered. **HEAT**, **STEAM**, **ELECTRICITY**, **WATER POWER**, **WIND**, etc., are all treated in their proper places, but under this head may conveniently be included articles describing the means for transforming energy into mechanical power available for a thousand and one different purposes. See:

Hot-Air Engine
Compressed-Air Engine
Compressed-Air Locomotive
Gas-Engines

Internal-Combustive Engines

Motor Vehicle

Fireless Engine

Steam Engine

Steam Turbine

Water Wheel

Windmill

Hydraulic Ram

Hydraulic Press

Hydraulic-Pressure Engine

Dynamo-Electric Machinery

Mechanical Powers

STEAM AND STEAM ENGINE.

Commencing with a consideration of the properties of steam, any discussion soon reaches the **STEAM ENGINE** and its various parts and its applications. Such will be found in the classification given below :

Steam

Boiler

Economizers

Shaking Grates

Æolipile

Steam Engine

Locomotive

Steam Navigation

Steam Turbine

Pumps and Pumping Machinery

Eccentric

Crank

Fly-Wheel

Governor

Valve

Injector

Indicator

Safety Valve

Condenser

Horse-Power

ELECTRICAL ENGINEERING.

In **Electrical Engineering**, we may include the generation and distribution

of electric current, also its use for light and power, and the methods by which it is transmitted to considerable distance. The subject is treated in the following articles :

Dynamo-Electric Machinery

Armature

Cable, Electric

Transformer

Synchronizer

Transmission of Power

Electric Lighting

Electric Furnace

Electric Heater

Electric Railways

Urban Transportation

Electro-Chemistry

Storage Battery

Electrolysis

Welding

Lightning-Arresters

Electric Fuze (under Fuze)

For a discussion of the phenomena of the electric current, see the comprehensive section on **Electricity** in the chapter on **Physics**.

TOOLS.

Many and varied tools have been and are used by the mechanic, which are discussed in the articles dealing with the various industries. Certain groups and individual tools, however, demand consideration. Thus, **METAL** and **WOOD-WORKING MACHINERY** include many important tools, the chief types of which it is desirable to understand. **PNEUMATIC TOOLS** have resulted in considerable saving of labor and are of increasing importance. Many tools, such as the file, hammer, and axe, still survive and are not yet

replaced by machinery. The list in alphabetical order is as follows:

Axe
Boring Machinery
Calipers
Cutlery
Drill
File
Hammer
Jack
Mandril
Marlinespike
Metal-Working Machinery
Micrometer
Plane
Pneumatic Tools
Sand Blast
Sandpaper
Saw
Sawmill
Screw
Wood-Working Machinery

TELEGRAPH AND TELEPHONE.

The transmission of intelligence is constantly being accomplished more effectively and by a greater variety of methods, specialization having its play here as in other branches of applied electricity. The following articles may be recommended as supplying a complete idea of the history and development of these important processes:

Telegraph
Signaling and Telegraphing, Military
Lightning-Arresters
Telautograph
Telegraphy, Submarine
Atlantic Telegraph
Wireless Telegraphy
Telephony
Coherer
Telephone

Chapter 29. Efficiency and Industrial Management

WHILE few terms have been more abused in recent years than the word "Efficiency," which may be interpreted all the way from implying some occult science for making two blades of grass grow where one or even less previously flourished, to some simple means for securing greater output of a factory or business, it may be understood, however, in its strictly technical sense, as the ratio of the actual to the possible, or output to input. In such studies are involved much that can result and be interpreted to the advantage of mankind, so that in mathematical language a condition will be realized where this ratio will approach nearer to unity. For true efficiency there must be a knowledge both of the actual and the possible, expressed exactly and quantitatively, and then the employment of various means to eliminate waste and lost motion, so that the enterprise shall be more productive and yield greater returns, both gross and net. To accomplish this there are various methods, differing as to their manner and as to the claims advanced for their merits and workability, yet essentially the same if examined as regards their psychological and philosophical fundamentals.

Accordingly, when one investigates the subject of **SCIENTIFIC MANAGEMENT** he must first learn its objects and then appreciate wherein it is scientific, and then determine the various methods and schools of thought that have developed to secure these objects. Therefore, the student in this field should consult the fundamental articles on **EFFICIENCY** and **INDUSTRIAL MANAGEMENT**, but he will find also that in addition he will be required to inform himself as regards **BOOKKEEPING** and **ACCOUNTING**, for all studies in this field must depend upon records and bear a relation to the final system of accounts and values that show the profit of the enterprise. Accordingly, one might suggest the following list of titles that develop this interesting field of modern thought:

Efficiency
Industrial Management
Scientific Management
Legislative Management
Premium Plant
Motion Study
Time Study
Task and Bonus
Unit System

The articles **BOOKKEEPING** and **ACCOUNTING**, previously mentioned, should be read and also that on **RAILWAYS**, where, in the case of American railways, there has been much dispute as to the degree of efficiency that is secured in their operation, the principles of scientific management being designed to find application here if anywhere.

30. Military and Naval Science

AS the purpose of an army or any military organization is to carry on, or at least be prepared to carry on, war, either of defense or of offense, as effectively as possible, a study of the topic WAR, to ascertain under what circumstances recourse is had to the court of arms and under what conditions the laws and usages of nations demand that war shall be waged, makes a fitting beginning for reading in this field. Then, coming to the actual operations of war, we find that they must be planned according to the principles of STRATEGY and executed along lines worked out in systems of TACTICS. Accordingly, then, a suitable grouping of allied subjects is as follows:

A. Armies

War	Point d'Appui
Strategy	Retreat
Tactics, Military	Base of Operations
Military Aeronautics	Advance Guard
Attack	Cavalry Screen
Assault	Outposts
Fire	Picket
Battle	Patrol
Engagement	Guard
Skirmish	Main Guard
Invasion	Rear Guard
Blockade	Flank
Fortifications, Attack and Defense of	Reconnaissance
Siege	Prisoner
Sap	Contraband of War
Bombardment	
Coast Defense	ORGANIZATION.
Manœuvres	To carry out, however, any scheme of
Evolutions, Military	strategy and tactics involves an army
Demonstration	whose effectiveness depends upon its or-
Marching	ganization. In the organization of an
Manual of Arms	army, the INFANTRY, CAVALRY, and
À Cheval Position	ARTILLERY, or LINE, must be consid-
Ambuscade	ered. These are its prime essentials,
Ambush	together with its ENGINEERS, MEDICAL
Debouching	DEPARTMENT, COMMISSARIAT, Depart-
Échelon	ment of the QUARTERMASTER, SIGNAL
Enfilade	CORPS, Bureau of Military Justice, or
Feint	Judge Advocate's Department, its Pay
	Corps, GENERAL STAFF, and the vari-

ous other bureaus and departments upon the efficiency of which the successful organization and operation of a military body depend.

Looking at military organization from the point of view of the units of which an army is made up, we may start with the Corps, and gradually proceed from one command to an inferior one, learning the function of each and its relation to the common whole. RANK AND COMMAND is the keystone of military organization. Over each body of men there must be an appropriate officer, and to learn his duties it is but necessary to consult the article on this subject. In addition to officers, there may be certain subordinate individuals who have peculiar or individual functions to perform; these too are best described under their own heads. The accompanying lists suggest the relation of many of these topics. Dealing first with the division which may be headed Armies and Army Organization, we find large and adequate treatment, the historical side here as well as elsewhere in the Encyclopædia being considered. The first group deals with the divisions of military organization, the second, entitled RANK AND COMMAND, with the individuals of all ranks that form an army. See:

(a) *Armies and Army Organization:*

Army Organization
Armies
Corps
Division
Brigade
Regiment
Battalion
Squadron
Company

Battery
Platoon
Detachment
Artillery
Artillery Corps
Artillery Train
Cavalry
Infantry
Mounted Infantry
Engineer Corps
Medical Department, United States Army
Medical Department, United States Navy
Ambulance
Hospital Corps
Signal Corps
General Staff
Staff
Military Police
Band, Military
Pioneer
Sharpshooter
Color-Guard
Reserve
Cadre
Contingent
Column
Militia
Landwehr
War, Department of
Horse Guards
Life Guards
United States Army (under United States)

(b) *Rank and Command:*

Field-Marshal
General
Lieutenant-General
Major-General
Brigadier-General
Colonel
Lieutenant-Colonel

Major
 Captain
 Lieutenant
 Cadet, Military
 Cadet, Naval
 Adjutant-General
 Adjutant
 Aide-de-Camp
 Commissary
 Quartermaster
 Paymaster
 Surgeon, Military
 Inspector-General
 Chaplain
 Contract Surgeon
 Commander-in-Chief
 Commandant
 Field Officer
 Ensign
 Cornet
 Non-Commissioned Officer
 Color-Sergeant
 Drum Major
 Sergeant
 Corporal
 Gunner
 Artificer
 Drummer
 Orderly
 Private
 Bombardier
 Sentinel

MILITARY ENGINEERING.

To the military engineer are assigned many problems connected with the existence and operation of an army. He has to provide for its protection in both peace and war, which involves the construction of suitable barracks, camps, and fortifications, both temporary and permanent, and is besides required to study and delineate the country in which the troops live or operate.

Naturally, the chief division to be made in the topics relating to this subject is FORTIFICATION, involving the construction of more or less permanent works, and Field Engineering, dealing with those of a more temporary character. See:

Engineering, Military
 Fortification
 Military Architecture
 Battery
 Bastion
 Berm
 Blockhouse
 Caponiere
 Casemate
 Coast Defense
 Embrasure
 Epaulement
 Traverse
 Stockade
 Enccinte
 Frontier, Military
 Trench, Military
 Escarp
 Gallery
 Magazine
 Martello Tower
 Orillon
 Abatis
 Bill-Hook
 Blindage
 Barricade
 Cheveaux-de-Frise
 Fascines
 Gabion
 Approaches
 Parallels
 Siege and Siege Works
 Demolition
 Breach
 Camp
 Bridges and Docks, Military
 Mines and Mining, Military

Redoubt
Retrenchment
Revetment
Redan

FORTS OF THE UNITED STATES.

With a description of the principles of Fortification and Military Encampments, or posts, may properly be included a description of such military posts of the United States as are of importance for one reason or another. These are included in the following list, and the articles give information as to their location, garrison, general characteristics, etc.

Fort Adams
Fort Bliss
Fort Canby
Fort Caswell
Fort Clark
Fort D. A. Russell
Fort Douglas
Fort Du Pont
Fort Ethan Allen
Fort Flagler
Fort Grant
Fort Greble
Fort Hamilton
Fort Hancock
Fort Howard
Fort Jay
Fort Keogh
Fort Leavenworth
Fort Logan
Fort McHenry
Fort McPherson
Fort Meade
Fort Monroe
Fort Morgan
Fort Myer
Fort Porter
Fort Preble
Fort Riley

Fort Robinson
Fort Sam Houston
Fort Schuyler
Fort Sheridan
Fort Snelling
Fort Stevens
Fort Strong
Fort Terry
Fort Thomas
Fort Totten
Fort Trumbull
Fort Wadsworth
Fort Warren
Fort Washington
Fort Wayne
Fort William H. Seward
Fort Yellowstone
Columbus Barracks
Jefferson Barracks
Madison Barracks
Plattsburg Barracks
San Diego Barracks
Vancouver Barracks
Washington Barracks

ORDNANCE AND GUNNERY.

To carry on warfare, many weapons and resources have been placed at the disposal of the soldier. Such titles as ARTILLERY, ORDNANCE, EXPLOSIVES, AËROPLANES, SUBMARINES, GUNPOWDER, PROJECTILES, SMALL ARMS, naturally suggest themselves as principal topics. With them may be grouped the underlying science as embodied in BALLISTICS and GUNNERY, together with the other topics contained in the following list:

(a) *Artillery:*

Coast Artillery
Field Artillery
Horse Artillery
Mountain Artillery

Siege Gun
 Guns, Naval
 Rapid-fire Guns
 Machine Gun
 Mitrailleuse
 Gardner Gun
 Mortar
 Howitzer
 Air Gun
 Pneumatic Gun
 Submarine Gun
 Ordnance
 Ordnance Establishments
 Cannon
 Jacket
 Bore
 Calibre
 Artillery Carriages
 Gun-Carriage
 Limber
 Caisson
 Small Arms
 Carbine
 Chassepôt
 Arquebus
 Bayonet
 Pistol
 Revolver
 Target and Target Practice
 Sword

(b) *Projectiles:*

Ammunition
 Grape-Shot
 Case-Shot
 Canister
 Carcass
 Grenade
 Bomb
 Shrapnel
 Rocket
 Cartridge
 Torpedo

(c) *Explosives:*

Gunpowder
 Smokeless Powder
 Dynamite
 Nitroglycerin
 Atlas Powder
 Cordite
 Lyddite
 Maximite
 Picric Acid
 Dualine
 Fulminates
 Fulminate of Mercury
 Fulminate of Silver
 Pyrotechny
 Primer
 Fuze
 Greek Fire
 Charge
 Matches

(d) *Gunnery:*

Ballistics
 Range
 Range-Finder
 Aim
 Charge
 Plongée
 Ricochet
 Target and Target Practice
 Target Practice, Naval
 Proving Ground
 Loading-Tray

(e) *Historic Cannon:*

Coehoorn
 Columbiad
 Demi-Cannon
 Demi-Culverin
 Falcon
 Jingal
 Mitrailleuse

UNIFORM AND EQUIPMENT.

Closely connected with the soldier's

and sailor's weapons are his Uniform and Equipment, the various insignia often being matters of considerable interest and curiosity to the layman. With these subjects, we may include allied topics as follows:

- Military Insignia
- Uniforms, Military and Naval
- Aiguillettes
- Bandolier
- Busby
- Canteen
- Cartouch
- Chevrons
- Epaulet
- Facings
- Good Conduct Badges
- Haversack
- Helmet
- Képi
- Khaki
- Kit
- Knapsack
- Spur
- Sword

MILITARY CEREMONIES.

As a witness of various military ceremonies or other formalities, the layman comes in contact with certain other aspects of army and navy life. The more important of these will be treated under their respective heads. See the following:

- Salutes
- Feu-de-Joie
- Dress Ship
- Escort
- Review
- Inspection
- Parade
- Muster

FLAGS.

Flags of one kind or another, by rea-

son of their histories and tradition and their special uses at the present time, play an important part in military and naval affairs. Besides being the emblem of the nation, they may also pertain to various organizations or individuals, as the colors of a regiment or the flag of an admiral. These will be understood on reference to the following articles, many of which are illustrated by colored plates:

- Flag
- Ensign
- Colors
- Guidon
- Standard
- Pennant
- Jack
- Union Jack
- Flag of Truce
- Signaling and Telegraphing

HISTORIC AND SPECIAL MILITARY ORGANIZATIONS.

Military organizations in the past, as well as in the present, have been formed either for special purposes or under special auspices, or as independent commands. Some of the more famous classes of soldiers and historic military organizations are those included in the following list:

- Artillery Company, Ancient and Honorable
- Artillery Company, Honorable
- Bashi-Bazouks
- Beefeater
- Bersaglieri
- Black Watch
- Cameronians
- Carbineers
- Chasseurs
- Cohort
- Coldstream Guards

Colonial Corps
Cossacks
Cuirassier
Dragoons (under Cavalry)
Equestrian Order
Fencible
Foot Guards
Francs-Tirailleurs
Fusiliers
Green Mountain Boys
Grenadier
Grenadier Guards
Guard
Guerrillas
Guide
Gurkhas
Highlanders
Honvéd
Horse Guards
Household Troops
Hussars
Janizaries
Lancer
Landsturm
Landwehr
Legion
Life Guards
Mamelukes
Minute Men
Mobiles, Corps of
National Guard
Phalanx
Rangers, Mounted
Rifleman
Rough Riders Association
Scots Greys
Sepoy
Sikhs
Spahis
Streltsi
Trainbands
Voltigeurs
Yeomanry
Yeomen of the Guard

Zouaves

MILITARY LAW.

For the government of the army there are certain statutes and regulations. International law in many of its aspects touches on the acts of armies in the field. Accordingly, a grouping of certain topics allied, though not necessarily logically connected, may be made as follows:

Military Law
Acts of Hostility
Allegiance
Armistice
Articles of War
Belligerent
Blockade
Booty
Bounty
Capitulation
Cartel
Cashiering
Casus Belli
Conscription
Contraband of War
Council of War
Courts Military
Declaration of War
Desertion
Discharge
Judge-Advocate
Judge-Advocate-General
King's Regulations
Martial Law
Military Commissions
Military Government
Military Law
Military Police
Military Prison
Neutrality
Posse Comitatus
Prisoner
Privateering

Prize
Prize Courts
Provost-Marshall
Ransom
Spy
Truce
War

MILITARY AND NAVAL EDUCATION.

The professions of the soldier and sailor require from beginning to end continual training, and from Academy to War College there are many studies to be pursued. Grouping those topics referring to the education of the soldier and sailor, we have the following list:

Army Schools
Artillery Schools
Cadet, Military, Naval
Military Geography
Cavalry and Light Artillery School
Military Education
Military Academy, U. S.
General Service and Staff College
Staff Colleges and Schools
War College
Naval Academy, U. S.
Naval Schools of Instruction
Naval Institute, U. S.
Discipline
Drill
Drill Regulations

MISCELLANEOUS.

The food for the soldier and his animals is discussed under **RATIONS** and **FORAGE**, and its mode of preparation

under **FIELD COOKING**. The principal **BUGLE AND TRUMPET CALLS** that summon him to his duties are given with the music notes, and the **DRUM** and **FIFE**, which supply the field music, are also treated. Methods of **RECRUITMENT** in various countries, and also **RETIREMENT**, should be studied, while the **PAY AND ALLOWANCES** of the soldier must be considered in order to understand army conditions at home and abroad. An essential of modern military operations is the maintenance of communication between every part of an army and its base, or capital. This is the function of the **SIGNAL CORPS**, whose operations and apparatus are treated under **SIGNALING AND TELEGRAPHING, MILITARY**. In the event of casualties, the **SURGEON** and the **MEDICAL DEPARTMENT**, with its **HOSPITAL CORPS**, are called into requisition, protected as they are by the terms of the **GENEVA CONVENTION**. It is advantageous to learn the present conditions of **SURGERY, MILITARY**, and the peculiar problems that the military surgeon has to face, as well as his methods of operation. In this connection, also, should be mentioned the work of the **RED CROSS**, and the part it plays in alleviating suffering on the battlefield. Of importance, as in a small way reproducing some of the conditions of warfare, the **WAR GAME** is worthy of consideration, as on its board may be worked out many interesting problems in strategy and tactics.

B. Ships and Navies

No clearer distinction can be drawn in discussing vessels for navigating the seas than to consider separately those

for military purposes and those for commerce, but it is not always possible to make the separation complete,

and many subjects concerning nautical affairs cover or apply to both classes. Under NAVIES and SHIP AND SHIPPING (subhead *Ship, Armored*) are given historical accounts of the development of war craft, while the evolution of the merchant ship is traced under NAVIGATION, SHIPBUILDING, and SHIP AND SHIPPING (subhead *Power Navigation*). In the following lists the different kinds of warships, merchantmen, and boats which are separately described under their own titles are collected under the proper head:

(a) *Warships:*

Warship
Ship, Armored (subhead under Ship and Shipping)
Battleship
Cruiser
Fuel Ship
Gunboat
Torpedo Boat
Torpedo Boat, Submarine
Hospital Ship
Ram
Guard-Ship
Receiving Ship
Galley
Galliot
Triton
Fire-Ship
Floating Battery
Frigate
Monitor
Mortar Vessel
Corvette

(b) *Merchantmen:*

Ship and Shipping and its various subheads
Power Navigation (subhead under Ship and Shipping)
Clipper

Bark
Brig
Schooner
Sloop
General Ship
Composite Ships
Lighter
Whaleback
Yacht
Lugger
Junk
Grab
Dhow
Corsair
Ketch
Pinnace
Pirogue
Pram
Great Eastern
Launch, Launching
Derelict
Wreck

(c) *Boats:*

Lifeboat
Life-Rafts
Balsa
Launch
Whaleboat
Long Boat
Jolly-Boat
Punt
Cutter
Catboat
Canoe
Catamaran
Banca
Ice-Breaking Steamer
Barca
Kayak
Ferry

NAVIES, NAVAL AFFAIRS, ETC.

There is included under this head, in the following lists, articles pertain-

ing not only to the navy proper, but to such government services as are connected with naval and nautical affairs, such as Coast Guard, Life-Saving Service, etc.:

(a) *Organization and General Subjects:*

Navies
Tactics, Naval
Marine Corps
Engineer, Naval
Medical Department, United States Navy
Hydrographic Office
Navy, Department of the
Naval Academy
Naval Schools of Instruction
Naval College of Canada
Revenue Cutter Service, United States
Life-Saving Service
Coast Guard
Naval Reserve
Crew
Company, Ship's
Complement
Watch
Division
Landing Force
Billet
Mess
Pay and Allowances
Naval Reserve

(b) *Officers and Men:*

Admiral
Commodore
Captain
Commander
Lieutenant-Commander
Lieutenant
Ensign
Midshipman
Clerk, Paymaster's

Commanding Officer
Commandant
Flag-Officer
Executive Officer, United States Navy
Surgeon, Military and Naval
Paymaster
Watch Officer
Naval Constructors
Chaplain
Provost-Marshal
Pilot
Warrant Officer
Gunner
Master
Master-at-Arms
Mate
Carpenter, Navy
Boatswain
Machinist, Naval
Petty Officer
Quartermaster
Coxswain
Naval Apprentice
Landsman
Boys, Ships'

(c) *Naval Ordnance, Gunnery, Torpedoes, etc.:*

Guns, Naval
Gunpowder
Smokeless Powder
Guncotton
Rapid-fire Guns
Machine Guns
Target Practice
Target
Torpedo
Torpedo Director
Torpedo Net
Rangefinder
Stadimeter
Projectile
Mine, Submarine

(d) *Merchant Marine and Allied Subjects:*

Navigation
 Merchant Marine (of U. S.)
 Ship and Shipping, subheads of:
 Sailing Ship
 Power Navigation
 Classification of Ships for
 Marine Insurance
 Tables showing tonnage of
 ships built and building in
 the merchant navies of the
 world
 Great Eastern
 Load-line Marks of Vessels
 Measurement of Ships for Ton-
 nage
 Safety at Sea
 Rules of the Road at Sea
 Fog Signals
 Coasting Trade
 Trade, Board of
 Trinity House
 Crew
 Master
 Mate
 Pilot

See also the titles grouped under Maritime Law and Navigation on subsequent pages.

SHIPBUILDING AND NAVAL ARCHITECTURE.

The enormous size and great speed of many modern vessels require study, experience, and scientific attainments of the highest class for their design and construction. Under the head of SHIPBUILDING will be found a historical sketch of the subject, a description of the theory of design, of the means and methods of hull construction, and of the design, development, and construction of propelling and

other machinery. The principal titles under which shipbuilding information is to be found are:

Armor Plate
 Ship and Shipping, and subheads
 Shipbuilding, and subheads
 Launch, Launching
 Navigation
 Load-line Marks of Vessels
 Marine Engineering
 Steam Engine
 Steam Turbine
 Boiler
 Buoyancy
 Stability
 Metacentre
 Resistance
 Displacement
 Tonnage
 Measurement of Ships for Tonnage
 Lloyds
 A 1

The various parts of a vessel are almost infinite in number. The articles SHIPBUILDING and SHIP will tell of these various parts and describe how the skill of naval architect, marine engineer, and shipbuilder unites them into one congruous whole. Such parts, however, often possess distinct features and characteristics which need separate treatment, and these are included in the following list:

Beak
 Bilge
 Beam
 Bottom
 Bow
 Bridge
 Bulkhead
 Bulwark
 Cockpit
 Cofferdam
 Companion

Deck
Figurehead
Gangway
Hawse
Helm
Hold
Keel
Keelson
Paddle-Wheel
Poop
Screw Propeller
Smokepipe

To gain a good idea of the rigging of a ship and the names of masts, sails, etc., the best plan is to consult the plate accompanying the article *SHIP*, where all the various parts of the rigging of a full-rigged ship are indicated and specified. There are various topics connected with sails and rigging that are described and their functions shown in brief articles. Such a list includes the following:

Belay
Block
Boom
Bowsprit
Brace
Brail
Bridle
Burton
Clip Hooks
Cordage
Crow's-Nest
Davit
Gaff
Halliards
Jib
Jury
Knotting and Splicing
Lateen Sail
Lug-Sail
Mast

Purchase
Rigging
Sail
Spanker
Spinnaker
Sprit
Stay
Tackle

Connected with the ship, but not wholly falling in any of the above classes, are many essentials such as the *ANCHOR*, the *BINNACLE*, the *DAVIT*, etc. These adjuncts are specially designed for specific purposes, which the reader naturally desires to understand. The following list includes some of the more important subjects in such a grouping:

Anchor
Ballast
Batten
Bells
Binnacle
Block
Boiler
Boiler (under Shipbuilding)
Bridle
Buoy
Burton
Cable
Canvas
Capstan
Cat
Cofferdam
Compass
Controller
Cordage
Davit
Fender
Ground-Tackle
Mooring Swivel
Kedge
Knotting and Splicing

Lifeboat
 Life Buoy
 Life-Preservers
 Life-Rafts
 Life-Saving Guns and Rockets
 Life-Saving Service
 Lights
 Marling Spike
 Oakum
 Purchase
 Rope
 Smokepipe
 Stopper
 Tackle
 Wheel
 Winch
 Windlass

Safety at Sea
 Rhumb Line
 Meridian
 Map
 Loxodrome
 Chart
 Hydrography
 Meteorology, Marine
 Sound, Sounding
 Coast Pilot
 Bowditch's Practical Navigator
 Almanac
 Nautical Almanac
 Ephemeris
 Pilot Chart
 Protractor
 Sextant
 Quadrant
 Vernier

NAVIGATION.

Navigation involves the conducting of a vessel from one port to another by making use of charts, the position of various heavenly bodies as determined by the navigator, and such other data as he can obtain by observation and calculation. In general this is contained in the article NAVIGATION, but further details and explanations are given of incidental topics. The following list will be found by the reader sufficiently comprehensive:

Navigation
 Latitude and Longitude
 Sailings
 Binnacle
 Compass
 Log
 Reckoning
 Dead Reckoning
 Day's Work
 Departure
 Deviation
 Fog Signals
 Rules of the Road at Sea

SEAMANSHIP.

Seamanship may be distinguished from navigation as dealing with the actual practice, rather than the theory, involving the handling of vessels and the means taken to insure their safety. Thus, under this head, is discussed such important subjects as the RULES OF THE ROAD, the use of the LOG, TACKING, jibing, mooring, and the various manœuvres and operations carried on at sea and in port. These hardly fall in a logical order, but the more important are contained in the following list:

Tacking and Wearing
 Jibe
 Boxhauling
 Lec
 Leeway
 Moor, Mooring
 Log
 Log-Book
 Helm

Steering
Port
Larboard
Starboard
Bearing
Sound, Sounding

MARITIME LAW.

Vessels sailing on the high seas are governed by rules and usages which have given rise to a body of laws known as admiralty and maritime law. Furthermore, such vessels are required to observe the statutes of the countries whose flags they fly, and such formalities as are duly prescribed. Connected with such governmental regulations are those of marine underwriters and insurance principles, forming a large department of maritime law. Interests at sea are also considered by international law, and prizes and privateering are subjects which it must consider. A grouping of interesting topics in these more or less related branches is as follows:

International Law
Admiralty Law
Maritime Law
Navigation Laws
Navigation, Freedom of
Ship's Papers
Manifest
Bill of Lading
Clearance
Bill of Health
Charter-Party
Cargo
Freight
Demurrage
Admiralty, The

Bounty
Collisions of Vessels
Bottomry Bond
Respondentia
Salvage
Derelict
Wharfage
Jettison
Barratry
Quarantine
Marine Insurance
Lloyds
A 1
Measurement of Ships for Tonnage
Tonnage
Load-line Marks of Vessels
Privateering
Prize
Prize Courts
Desertion
Safety at Sea

As the sailor must make his base of operations on shore, it is proper to consider such subjects as NAVY YARDS, DOCKS, etc., where he may secure supplies and protection. The following list indicates certain articles that will be of assistance in this respect:

Navy Yard
Dockyards, Royal
Arsenal
Reef
Harbor
Breakwater
Dock
Wharf
Torpedo Station
Naval Academy

Chapter 31. The Great War

THE WAR IN EUROPE is treated in an article that has been written by some of the best experts obtainable, and is a complete history of it in all its phases. It is divided into the following subdivisions: I, Underlying Causes; II, Outbreak of the War; III, Military Operations; IV, Naval Operations; V, Aërial Operations; VI, Alleged Atrocities in the War; VII, Destruction of Art and Architecture; VIII, Neutral Nations; IX, Relief Measures; X, Financial and Economic Aspects; XI, Bibliography. It is the purpose of this chapter to supplement the cross-references in the article itself, with a complete list of articles in the NEW INTERNATIONAL ENCYCLOPÆDIA, which deal directly or indirectly with the war.

On June 28, 1914, Archduke Francis Ferdinand, the Austrian heir apparent, was assassinated with his wife at Sarajevo, the capital of Bosnia. This was the match that touched off the conflagration which had been brewing in Europe for years. Austria-Hungary, accusing Serbia of complicity in the affair and declaring that it was the Serb aim to secure the provinces of Bosnia and Herzegovina, sent an ultimatum to Serbia on July 23. Serbia's reply, delivered just before the expiration of the time limit, only partially complied with Austria-Hungary's demands. Despite the most strenuous efforts on the part of the larger countries of Europe, Austria-Hungary declared war on Serbia on July 28. Russia, the champion of the Slav Balkan States, issued an order of mobilization and, upon the refusal to withdraw this order, Germany declared war on her. This turned all Europe into an armed camp. France and England came to the aid of Russia, and Germany stood by her ally, Austria-Hungary. Italy, claiming that her Alliance with Germany and Austria-Hungary was purely defensive and claiming further that Austria-Hungary's declaration of war on Serbia was offensive, refused to join her partners in the Triple Alliance. Rumania joined the Entente in August, 1916, and, as a result of the unrestricted submarine warfare announced by Germany on January 31, 1917, the United States declared war against her on April 6, 1917. A list of additional belligerents is given in the section, OUTBREAK OF THE WAR.

I. Underlying Causes

The Underlying Causes of the Great War fall naturally under three heads, namely: (1) National Antagonisms, (2) Militarism, and (3) Economic Rivalry.

1. NATIONAL ANTAGONISM.

The problem of national antagonism was an outgrowth of the Congress of Vienna, which concluded the French Revolution and Napoleonic periods. At this Congress many of the diplomats hoped that the principles of the French Revolution would be recognized and that the ruling ideas would be the recognition of the growth of democracy and the realization of national liberty. Because of the opposition of the reactionaries, particularly Metternich, these

ideas were subjugated and the attempt was made to restore the *ancient régime*. Thus we find the problem of nationality cropping up continually in the nineteenth century. Two examples of this will suffice to show the truth of this statement. As a result of the FRANCO-GERMAN WAR, Germany annexed Alsace and Lorraine, French-speaking territories. At the CONGRESS OF BERLIN, Russia's hopes of making the Balkan peninsula a Slav sphere of influence were frustrated by the jealousy of the other European powers. The French consequently hoped for the day of restoration and the national awaking of Russia foreshadowed her expansion to the Mediterranean. It might be mentioned, in passing, that if the principle of nationality was to be loyally carried out, the heterogeneous Austro-Hungarian Empire would be completely divided up among its neighbors, Transylvania to Rumania, Austria, proper, to Germany, etc.

Consult the following list of articles for a history of the growth of national antagonisms since the beginning of the nineteenth century:

French Revolution
 Napoleon I
 Peninsula War
 Tugenbund
 Vienna, Congress of
 Alexander I (Russia)
 Charles XIV John (Sweden)
 Stewart, Robert (Second Marquis
 of Londonderry, Castlereagh)
 Wellington, A. W.
 Hardenberg, K. A.
 Humboldt, K. W.
 Metternich, C. W. N. L.
 Nesselrode, K. R.
 Stein, H. F. K.
 Talleyrand-Perigord, C. M.
 Crimean War
 Declaration of Paris
 Paris, Treaties of
 Seven Weeks' War
 Schleswig-Holstein
 Bismarck-Schönhausen, K. O. E. L.
 William I (Germany)
 William II (Germany)
 Franco-German War
 Alsace
 Lorraine
 Benedetti, Vincent
 Napoleon III

Cavour
 Mazzini
 Garibaldi
 Eastern Question
 Russo-Turkish War
 Berlin, Congress of
 Pan Slavism
 Pan-Germanism (under War in
 Europe)
 Africa
 Turco-Italian War
 Balkan War

In order to learn the part played by individual countries during the nineteenth and early twentieth centuries, as well as to find such important historical material bearing on national antagonisms as the unification of Italy (under ITALY), the Graeco-Turkish War of 1897 (under GREECE), etc. See the historical sections of the following:

Albania
 Austria-Hungary
 Belgium
 Bosnia
 Bulgaria
 Denmark

France
 Germany
 Greece
 Herzegovina
 Italy
 Montenegro
 Netherlands
 Norway
 Poland
 Portugal
 Rumania
 Russia
 Sardinia
 Servia
 Sicilies, Kingdom of the Two
 Spain
 Switzerland
 Turkey
 United Kingdom of Great Britain
 and Ireland

For the biographies of statesmen, soldiers, etc., prominent during the war see the treatment of the countries involved in Chapter I of this volume. Supplementary to the lists given there are the additional biographical footnotes at the bottom of the pages of the War in Europe article.

2. MILITARISM.

Militarism, as defined in the *NEW INTERNATIONAL ENCYCLOPEDIA*, is "A term employed somewhat loosely to designate a tendency to subordinate civil to military considerations in the policy of the State." We find that all the powers of Europe illustrate this tendency to a greater or less degree. Each has watched any move by the other and attempted to meet any increase in armament by a similar increase. For example, when Germany increased her army in 1913, France passed a law changing the term of ser-

vice to 3 years, because her slowly increasing population would not permit an outright increase. To appreciate the modern tendency, consult the sections on *ARMIES* and *NAVIES* in the articles on the more important countries mentioned above and the following general subjects, which contain also many appropriate cross references:

Militarism
 Armies
 Navies
 Military Education
 Imperialism
 Industrialism
 Peace Movement, International

3. ECONOMIC RIVALRY.

For the economic causes of the war it is not necessary to go back further than the beginning of the nineteenth century. Then occurred the Industrial Revolution, which substituted the factory system of manufacture for the cottage system. It also introduced the problem of capital and labor. With the vast increase in production, it was only natural that European countries should look for a market for their goods commensurate with the output. England had a monopoly of manufactures for almost three quarters of a century. Then France, Germany, etc., felt the effects of the revolution and began to look for their "places in the sun." The chief form taken by this economic rivalry was colonization and preferential tariffs. Africa and Asia were partitioned, practically between France and England, thus leaving Germany with no desirable place of expansion. Germany maintained that the adoption of preferential tariffs by the British colonies were attempts to crip-

ple German trade. For history of colonization and the tariff systems see history of countries mentioned *supra* and the following articles:

Political Economy
Industrial Revolution
Factories and the Factory System
International Trade
Commerce
Custom's Duties
Free Trade
Protection
Tariff
Mercantilism
Reciprocity
Taxation
Imperialism
Imperial Federation
Industrialism
Colony
Canada
Australia
India
New Zealand

Africa
Union of South Africa
Egypt
Morocco
Tripoli
German East Africa
German Southwest Africa
Kamerun
Togoland
Algeria
Angola
French West Africa
Upper Senegal and Niger
Asia
Persia
Afghanistan
Beluchistan
China
Manchuria
Korea
Eastern Question
Far Eastern Question
Open Door

II. Military Operations

The military operations in the WAR IN EUROPE are treated under the following main divisions:

I. Introduction and Discussion of Mobilization.

II. Western Theatre, or Campaign against France.

III. Eastern Theatre, or Campaign against Russia.

IV. Southern Theatre or Serbian and Italian Campaigns.

V. Southeastern Theatre or Turkish Campaigns.

For technical subjects, see the chap-

ter on MILITARY AND NAVAL SCIENCE and the following special articles:

Armies (also section under each country)
Mobilization
Army Organization
Artillery
Cavalry
Infantry
Frontier, Military
Militia
Military Education
Military Geography
Tactics, Military
Ammunition
Ballistics

Engineering, Military
Ordnance
Fortification
Battle

Articles which have had special treatment because of the war include the following:

(a) *Western Front:*

Ghent
Havre
Huy
Kiel
Knocke
La Bassée
La Fère
Lens
Liège
Lierre
Lille
Longwy
Lorraine
Louvain
Luxemburg
Lys
Maubeuge
Meaux
Mechlin
Menin
Metz
Meurth-et-Moselle
Meuse
Mézières
Mons
Montmedy
Moselle
Namur
Nancy
Nieuport
Nish
Novogeorgievsk
Ostend
Paris
Peronne

Piotrokov
Plock
Pont-A-Mousson
Poperinghe
Posen
Rheims
Roubaix
Roulers
Roye
Saarburg
Saint Dié
Saint-Quentin
Soissons
Souchez
Tirlemont
Toule
Tourcoing
Valenciennes
Verdun
Verviers
Ypres

(b) *Eastern Front.*

Galicia
Graudenz
Ivangorod
Jaroslau
Kalish
Kielce
Kolmar
Kolo
Königsberg
Krasnick
Lask
Lemberg
Lodz
Lomza
Lowicz
Lublin
Lyck
Marienburg
Marmaros-Szigét
Masurenland
Mlawa
Ostrolenka

Pinsk
 Poland
 Przasnysz
 Przemyśl
 Rzeszów
 Saint Petersburg
 Sambor
 Shavli
 Siedlce
 Silesia
 Stanisław
 Stryj
 Suczawa
 Suwałki
 Tannenburg
 Tarnopol
 Tarnów
 Thorn
 Tilsit
 Tomaszów
 Transylvania
 Vilna
 Warsaw
 Wieliczka

(c) *Southern Front:*

Mostar
 Pirot
 Pola

Pozarévatz
 Prisrend
 Roveredo
 Saloniki
 Scutari
 Semendria
 Senlis
 Sarajevo
 Shabatze
 Tyrol
 Udine
 Uskop

(d) *Southeastern Front:*

Kars
 Khopa
 Suez Canal
 Tabriz
 Transcaucasia
 Urumia
 Van

(e) *Colonies:*

German East Africa
 German Southwest Africa
 Kiaochow
 Tahiti
 Union of South Africa
 Windhoek

III. Naval Operations

The naval operations during the Great War took place on almost every known sea. Engagements between fleets were comparatively scarce, until the great battle off Jutland. This engagement, with those off the coast of Chile and near the Falkland Islands, were the most important fleet activities. Outstanding features of the naval operations were the submarine warfare, the spectacular raids on merchantmen, the blockade of Germany and

the transportation of large numbers of troops from one place to another by the Allies. This section of the article is divided into the following divisions:

Operations in the North Sea and the Waters about Great Britain
 Operations in the Baltic
 Operations in the Mediterranean
 Operations in the Black Sea and Dardenelles
 Cruiser Operations in the Atlantic, Pacific and Indian Oceans

Naval Strategy of the War Some Naval Lessons of the War

For a complete list of the more important articles in the NEW INTERNATIONAL ENCYCLOPÆDIA dealing with naval science, see Chapter 30 in this volume. Some of this might well be mentioned here, together with titles brought into prominence by the war. See also section on *Navies* of the countries involved:

Navies
Armor Plate
Battleship
Ship, Armored
Torpedo Boat
Signals, Marine
Tactics, Naval
Target Practice, Naval
Naval Aëronautics
Naval Reserve
Naval Schools of Instruction

Naval Stores
Hartlepool
Helgoland
Kaiserwilhelmsland
Keeling Islands
Kiaochow
Kiel
Libau
Lissa
Marshall Islands
Memel
New Guinea
Odessa
Ragusa
Reval
Samoan Islands
Scarborough
Sebastopol
Solomon Islands
Togoland
Trebizond
Varna
Yarmouth

IV. Aerial Operations

For the first time in history, aerial operations played an important rôle in warfare. The aerial section of the Great War articles tells the different use to which the different types of aircraft were put. Consult Chapter 17 in this volume dealing with AËRONAUTICS. See:

Aëronautics
Navigation, Aërial, Law of
Military Aëronautics

Naval Aëronautics
Hangar
London
Luneville
Paris
Saarbrücken
Sandringham
Treves
Trieste
Venice
Verona

V. Neutral Nations

As the war developed it became almost as difficult for a neutral to maintain an attitude of strict neutrality as it was to be a belligerent. The trade

markets of the world were completely upset and all routes and methods of transportation changed entirely. Commerce carrying vessels of the bel-

ligerents were requisitioned for war purposes, and in many neutral countries also political, as well as economical, disturbances resulted. The destruction of neutral vessels, the seizure of neutral mails, etc., brought forth protests from many neutral nations. Besides the historical sections of the neutral nations, such as

Switzerland, Norway, Sweden, the Netherlands, see:

International Law
Neutrality
Armed Neutrality
Blockade
Contraband of War
Declaration of Paris
London, Declaration of

VI. Financial and Economic Aspects

The problem of financing the Great War proved to be extremely difficult. With trade and industry all but at a standstill, the usual channels for borrowing money were closed. War taxes of all descriptions were levied and old taxes were greatly increased. Large loans were sought at home and abroad. A large joint loan floated in the United States by the Entente Allies was followed by various national loans secured by undoubted collateral, as well as by the resources of the respective governments. The following list includes the more important ar-

ticles which deal with financing a war:

Tax
Moratorium
Credit
Rediscounting
Stock Exchange
Bonds
Stocks
Panic, Financial
Crisis, Economic
Money
Marine Insurance
Bank, Banking
Foreign Money

Chapter 32. Medicine

THE dissemination of some medical knowledge among the laity is a matter of inestimable social importance. Popular ignorance on the subjects of hygiene, the prevention of disease, and the care of the sick, places many widespread evils sadly beyond the power of the medical profession. The average man's failure, moreover, to appreciate clearly the soundness of the principles and methods of medical science invites the appearance in the community of various mystical, or mystifying, quacks, claiming to know therapeutic methods of all but miraculous efficiency, and offering to sell medicines which, like the philosopher's stone once vainly sought by the alchemists, possess unlimited curative powers. Honest and valuable knowledge to-day has no secrets, and, notwithstanding, or rather because of, really considerable development, is professedly aware of its limitations. Perhaps, therefore, the clearest mark of the impostor or incompetent is the alleged possession of secrets or of methods of universal applicability. Nor will the cunning theories, widely advertised in support of such allegations, appear at all reasonable to the man who has familiarized himself with the main principles and facts of scientific—that is, rational—medicine.

The lists of articles presented in the following pages map out a complete course of systematic reading in medicine. A true understanding of the purely medical subjects, even in their elementary aspects, is possible only after the acquisition of some knowledge of the general biological sciences and of chemistry. Thus, human anatomy is best understood if studied in connection with comparative anatomy. Physiology is more or less obscure if studied without a preliminary knowledge of the general principles of chemistry and biology, and, again, human physiology should be studied in connection with the physiology of the lower animals. Even general botany presents a number of points of the highest interest to the student of human anatomy and physiology. Should the assiduous reader of the *Encyclopædia* desire to familiarize himself with these and cognate subjects, the present volume will readily afford the necessary guidance. We would especially call attention to the psychological articles on the special senses and faculties, without which the physiological functions of the brain and nervous system cannot be thoroughly understood. Further, a large number of chemico-physiological articles on special foods, and of articles on subjects of veterinary medicine, will be found listed in the chapter Agriculture, Horticulture, and Forestry, those articles having been prepared for the *Encyclopædia* by the food and veterinary experts of the United States Department of Agriculture.

The classification of the medical subjects proper, on which the lists below are based, and the order of sequence of the subjects in the lists themselves, are those adopted by the best medical authorities, with slight modifications to suit the distribution of subject-matter in the *Encyclopædia*. The only considerable deviations from general usage are in the case of anatomy and physiology, the two being somewhat closely interwoven in the *Encyclopædia* and therefore, here, too, arranged as one joint subject. The listed articles comprise a complete

treatment of essentials. The reader desiring more detailed information on particular bones, muscles, nerves, etc., will be guided to the special articles on such subjects by cross-references in the articles listed.

The only lists in which the order of sequence of the topics is not according to some recognized system are those under "Symptoms and Morbid Conditions" (division, Pathology and Therapeutics) and "Diseases of the Skin" (division, Diseases of the Nose and Throat, Ear, Eye, Skin, and the Genito-Urinary System). The former list comprises those symptoms and morbid conditions that are common to more than one class of diseases and that could not, therefore, be included in the somewhat rigidly classified lists preceding. On the other hand, the orders of sequence of skin diseases usually adopted in special medical works are practically useless. It was, therefore, deemed best in both cases to preserve the alphabetical order—for convenience of reference. The list of "Drugs" (division, Materia Medica) includes all the pharmacopœial preparations in frequent use. A number of rarer drugs may be found described in the articles on chemical subjects.

The biographies of famous medical men are arranged in the order of historical sequence and, together with the articles listed under "History," form a complete presentation of the history of medicine—a truly fascinating subject. Interesting historical detail will also be found in the articles on all medical topics of any importance. The inclusion of such historical articles as BATH, BARBER, EMPIRIC, DERIVATION, BLACK DEATH, PLAGUE, INOCULATION, etc., would have swelled the lists unnecessarily.

1. INTRODUCTORY ARTICLES.

Medical Education
Homœopathy
Eclectic School of Medicine
Nurses, Training of
Clinic
Hospital
Dispensary
Ambulance
Insane Asylum
Bedlam
Gheel
Epileptic Colony
Vital Statistics
Sanitary Laws
Health, Boards of
Contagious Diseases
Hippocratic Oath
Medical Code

Malpractice
Medicine

II. ANATOMY AND PHYSIOLOGY.

1. *General Articles:*

Anatomy
Physiology

2. *Bones, Muscles, and Ligaments:*

Bone
Cartilage
Marrow
Periosteum
Suture
Ossification
Skeleton
Skull
Spinal Column
Rib
Sternum

Muscle and Muscular Tissue

Tendon

Ligament

Flesh

Muscular Force

Diaphragm

Joint

Shoulder-Joint

Arm

Hand

Hip-Joint

Thigh

Knee-Joint

Patella

Leg

Foot

3. *Cavities:*

Skull

Chest

Abdomen

Pelvis

4. *Nervous System and Brain:*

Nervous System and Brain

Cerebro-Spinal Fluid

Inhibition

5. *Circulatory System:*

Circulation

Heart

Vein

Artery

Pulse

Aorta

Innominate Artery

Carotid Artery

Iliac Arteries

Blood

Blushing

6. *Respiratory System:*

Respiration, Organs and Process of

Pharynx

Larynx

Voice

Trachea

Bronchus

Asphyxia

7. *Alimentary System:*

Alimentary System

Digestion, Organs and Processes of

Food

Nutrition

Teeth

Pharynx

Salivary Gland

Œsophagus

Stomach

Pepsin

Intestine

Peristaltic Motion

Pancreas

Pancreatin

Liver

Bile

Brunner's Glands

Absorption

Colon

Cæcum

Vermiform Appendix

Rectum

Anus

Fæces

8. *Genito-Urinary System.*

Puberty

Menstruation

Climacteric Year

Reproduction

Ovary

Fallopian Tubes

Uterus

Vagina

Bartholin's Glands

Breast

Kidney

Ureter

Bladder

Urethra

Urine

9. *Special Senses:*

Nose

Eye

Ear

Tongue

Touch

10. *Ductless Glands and Lymphatic Structures:*

Thyroid Gland

Thymus Gland

Suprarenal Capsules

Pituitary Body

Spleen

Tonsil

Lymphatic

Thoracic Duct

Lacteal

Chyle

Lymph

11. *Tissues:*

Histology

Epithelium

Gland

Skin

Hair

Sweat

Nail

Scalp

Membrane

Mucous Membrane

Connective Tissue

Adipose Tissue

Endothelium

Serous Membrane

Pericardium

Pleura

Mesentery

Peritoneum

Periosteum

Muscle and Muscular Tissue

Nervous System and Brain

12. *Embryology:*

Embryology, Human

Epigenesis

Embryo

Fœtus

13. *Physiological Subjects not included Above:*

Chemistry, Physiological

Life, Mean Duration of

Rigor Mortis

Longevity

Metabolism

Animal Heat

Temperature of the Body

Sleep

Hypnoscope

Sex

Sensation

Secretion

Vivisection

Vegetarianism

III. *HYGIENE AND PROPHYLACTIC METHODS.*

Hygiene

Sanitary Laws

Sanitary Science

Health

Immunity

Quarantine

Disinfectants

Heating and Ventilation

Water Supply

Water Purification

Sewage Disposal

Food

Diet

Infants, Feeding of

Wine

Sterilized Food

Exercise

Physical Training

Bath

Vaccination

IV. PATHOLOGY AND THERAPEUTICS.

1. *General Articles:*

Pathology
Therapeutics
Disease
Nosology
Disease, Germ Theory of
Distribution of Diseases.
Congenital Disease
Degeneration
Intermarriage
Filth Disease
Occupational Diseases
Endemic
Epidemic
Infection
Insects, Propagation of Disease
 by
 Bacteria
Microscopy, (Clinical
Toxin
Virus
Homœopathy
Eclectic School of Medicine
Christian Science
Osteopathy
Leeching

2. *Specific Infectious Diseases:*

Typhoid Fever
Relapsing Fever
Smallpox
Chicken Pox
Scarlet Fever
Measles
Mumps
Whooping Cough
Influenza
Dengué
Meningitis
Erysipelas
Diphtheria
Croup
Septicæmia

Poliomyelitis
Cholera
Yellow Fever
Black Vomit
Plague
Dysentery
Malaria and Malarial Fever
Ague
Jungle Fever
Malignant Pustule
Anthrax
Intermittent Fever
Remittent Fever
Hydrophobia
Tetanus
Trismus Nascentium
Syphilis
Tuberculosis
Scrofula
Glanders
Actinomycosis
Febricula
Malta Fever

3. *Constitutional Diseases:*

Rheumatism
Lumbago
Gout
Diabetes
Rickets
Scurvy
Purpura
Hæmophilia
Obesity

4. *Diseases of the Alimentary System:*

Mouth, Diseases of the
Aphthæ
Pharyngitis
Quinsy
Œsophagus
Stomach, Diseases of the
Gastritis
Dyspepsia

Indigestion
Enteritis
Gastro-Enteritis
Cholera Infantum
Mesentery
Liver, Diseases of the

5. *Diseases of the Respiratory System:*

Rhinitis
Hay Fever
Laryngitis
Bronchitis
Asthma
Tuberculosis
Pneumonia
Pleurisy
Hydrothorax

6. *Diseases of the Circulatory System:*

Heart, Diseases of the
Pericarditis
Endocarditis
Myocarditis
Palpitation
Angina Pectoris
Atheroma
Arterio-Sclerosis

7. *Diseases of the Blood and Ductless Glands:*

Anæmia
Chlorosis
Leucocythæmia
Goitre
Cretinism
Myxœdema
Basedow's Disease
Acromegaly
Addison's Disease

8. *Diseases of the Kidneys:*

Kidney, Diseases of the
Bright's Disease
Uræmia

9. *Diseases of the Nervous System and Brain:*

Neurology
Nervous Disease
Nervousness
Paralysis
Neuritis
Sciatica
Facial Paralysis
Caisson Disease
Myelitis
Locomotor Ataxia
Syringomyelia
Brain, Diseases of the
Aphasia
Apoplexy
Hemiplegia
Hydrocephalus
Paralysis Agitans
Chorea
Epilepsy
Hystero-Epilepsy
Migraine
Neuralgia
Facial Neuralgia
Neurosis
Hysteria
Sea-Sickness
Neurasthenia
Hypochondriasis
Rest-Cure
Acromegaly
Stammering
Nostalgia
Fatuity
Imbecility
Idiocy
Insanity
Delirium
Dipsomania
Melancholia
Mania
Paranoia
Pellagra

- | | |
|---------------------------------------|--------------------|
| Monomania | Ecchymosis |
| Pyromania | Embolism |
| Kleptomania | Epistaxis |
| Homicidal Mania | Fainting |
| Puerperal Insanity | Fatty Degeneration |
| Paresis | Fever |
| Lucid Interval | Formication |
| Imitative Insanity | Hæmaturia |
| 10. <i>Parasitic Diseases:</i> | Hæmoptysis |
| Parasitic Diseases | Headache |
| Worms | Heat-Stroke |
| Oxyuris | Hectic Fever |
| Trichiniasis | Hemiopia |
| Sleeping-Sickness | Hiccough |
| Filaria | Hyperæsthesia |
| Lumbricoid | Hypertrophy |
| Tapeworm | Insomnia |
| 11. <i>Symptoms and Morbid Condi-</i> | Jaundice |
| <i>tions:</i> | Knee-Jerk |
| Albuminuria | Leucorrhœa |
| Amblyopia | Locomotor Ataxia |
| Amenorrhœa | Muscæ Volitantes |
| Anosmia | Nausea |
| Aphonia | Œdema |
| Arcus Senilis | Osteomalacia |
| Asthenopia | Oxaluria |
| Bedsores | Papule |
| Breath, Offensive | Pectoriloquy |
| Cachexia | Petechia |
| Catalepsy | Pleurodynia |
| Catarrh | Polydipsia |
| Colic | Pulse |
| Coma | Purpura |
| Congestion | Pyrosis |
| Constipation | Respiratory Sounds |
| Convulsion | Senility |
| Coughing | Sitophobia |
| Cramp | Skin Disease |
| Crisis | Spasm |
| Cyanosis | Starvation |
| Degeneration | Sweat |
| Diarrhœa | Symptom |
| Dropsy | Tenesmus |
| | Thirst |

Tinnitus Aurium
 Urine, Incontinence of
 Vertigo
 Vomiting
 Waxy, or Amyloid Degeneration

12. *Diagnostic and Therapeutic
 Methods and Instruments:*

Diagnosis
 Percussion
 Auscultation
 Stethoscope
 Dynamometer
 Axillary Thermometer
 Temperature of the Body
 X-Rays
 Microscopy, Clinical
 Laryngoscope
 Ophthalmoscope
 Therapeutics
 Diet
 Exercise
 Movement Cure
 Hydrotherapy
 Massage
 Rest-Cure
 Transfusion of Blood
 Venesection
 Radium

V. SURGERY, GYNÆCOLOGY, AND OB-
 STETRICS.

1. *General Articles:*

Surgery
 Surgery, Military
 Obstetrics

2. *General Surgical Pathology:*

Inflammation
 Suppuration
 Pus
 Abscess
 Boil
 Felon
 Carbuncle
 Ulcer

Phagedena
 Sinus
 Fistula
 Necrosis
 Gangrene
 Caries
 Adhesion
 Cicatrization
 Bruise
 Wound
 Gunshot Wound
 Dissection Wounds
 Burns and Scalds
 Frostbite
 Tumor
 Cyst
 Hydatid
 Actinomycosis
 Adenitis
 Septicæmia
 Pyæmia
 Shock

3. *General Surgical Technique:*

Anæsthesia
 Antiseptic
 Acupressure
 Acupuncture
 Bleeding
 Drainage Tubes
 Ligature
 Suture
 Tourniquet
 Puerperal Fever
 Abortion
 Forceps
 Embryotomy
 Cæsarean, or Cæsarian, Opera-
 tion
 Leeching
 Electricity, Medical Uses of
 Compressed-Air Treatment
 Respiration, Artificial
 Resuscitation
 Stomach-Pump
 Cupping

Organotherapy

Serum Therapy

Antitoxin

Tuberculin

Hypnotism

Hypodermic Medication

4. *Pathology of Special Structures:*

Artery

Aneurism

Phlebitis

Varicose Vein

Thrombosis

Embolism

Nerve-Stretching

Fracture

Callus

Osteomyelitis

Periostitis

Splint

Amputation

Sprain

Synovitis

Arthritis

Housemaid's Knee

Ankylosis

Dislocation

Resection

Wen

Keloid

Chapped Hands

Bunion

Corn

Skin-Grafting

5. *Orthopædic Surgery:*

Deformities

Wry-Neck

Pott's Disease

Spine, Curvature of the

Hip-Joint

Knock-Knee

Leg

Valgus

Varus

Clubfoot

Tenotomy

Artificial Limbs

6. *Regional Surgery, Including Gynæcology:*

Encephalocele

Concussion of the Brain

Trephine, Trephining

Rhinoplastic Operation

Harelip

Ranula

Dentistry

Laryngotomy

Tracheotomy

Choking

Mammary Gland, Diseases of

Rib, Fracture of the

Pleurisy

Empyema

Peritonitis

Gastrostomy

Umbilical Hernia

Hernia

Truss

Intussusception

Laparotomy

Vermiform Appendix

Perityphlitis

Ovary

Nephrotomy

Nephrectomy

Calculus, or Stone

Lithotrity

Lithotomy

Castration

Rectum, Diseases of the

Prolapsus Ani

Piles

Spina Bifida

Uterus, Diseases of the

Prolapsus Uteri

7. *Obstetrics:*

Obstetrics

Gestation

Superfœtation and Superfecundation

Placenta
Puerperal Fever
Caul
Umbilical Cord
Meconium
Weaning
Agalactia

VI. DISEASES OF THE NOSE AND
THROAT, EAR, EYE, SKIN, AND
THE GENITO-URINARY SYS-
TEM.

1. *Diseases of the Nose and Throat:*

Rhinitis
Epistaxis
Ozena
Polypus
Throat, Affections of the
Larynx, Diseases of the
Laryngitis

2. *Diseases of the Ear:*

Ear
Deafness
Cerumen
Otitis Media
Otorrhœa
Otalgia

3. *Diseases of the Eye:*

Eye, Diseases of the
Blindness
Ectropion
Entropion
Stye
Trichiasis
Conjunctivitis
Ophthalmia
Blepharitis
Cornea
Leucoma
Staphyloma
Iritis
Glaucoma
Cataract
Retinitis
Nyctalopia

Color-Blindness
Optic Neuritis
Sight, Defects of
Myopia
Hyperopia
Astigmatism
Heterophoria
Strabismus

4. *Diseases of the Skin:*

Acarus Folliculorum
Acne
Alopecia
Bromidrosis
Corn
Ecthyma
Eczema
Erythema
Favus
Hair
Ichthyosis
Impetigo
Itch
Leprosy
Lichen
Lupus
Nævus
Pemphigus
Pityriasis
Plica
Prurigo
Psoriasis
Ringworm
Rupia
Seborrhœa
Sycosis
Tinea
Vitiligo
Wart
Yaws

5. *Diseases of the Genito-Urinary
System:*

Cystitis
Calculus, or Stone
Extravasation

Prostate Gland
 Gonorrhœa
 Stricture
 Hydrocele
 Varicocele
 Syphilis
 Circumcision

VII. MATERIA MEDICA.

1. *General Articles:*

Materia Medica
 Pharmacopœia
 Toxicology
 Prescription

2. *Preparation of Drugs:*

Tincture
 Pill
 Liniment
 Lotion
 Plasters
 Infusion
 Extract
 Percolation
 Suppository
 Unguent
 Ointment
 Elixir

3. *Classification of Drugs:*

Alterative
 Tonic
 Excitant
 Narcotics
 Sedatives
 Hypnotics
 Anæsthetic
 Anodyne
 Antipyretic
 Febrifuge
 Expectorant
 Stimulants
 Gargle
 Emetics
 Anti-Emetic
 Bitters

Antacids
 Carminatives
 Cholagogue
 Laxative
 Purgatives
 Cathartic
 Hydragogues
 Anthelmintic
 Diuretics
 Diaphoretics
 Anhidrotics
 Antispasmodic
 Astringents
 Demulcents
 Diluents
 Aphrodisiac
 Anaphrodisiacs
 Emmenagogues
 Oxytocics
 Irritant
 Rubefacients
 Refrigerants
 Depilatories
 Disinfectants
 Poison
 Antidote

4. *Drugs:*

Quinine
 Mercury, Medicinal uses of
 Iodine
 Iodides
 Bromides
 Arsenic
 Iron
 Colchicum
 Colchicine
 Salicylic Acid
 Salicylates, Medical Uses of the
 Salicin
 Sulphur, Medical Uses of
 Fern, Male
 Kamala
 Santonin
 Goa Powder

Chrysarobin
 Phosphorus
 Alcohol, Pharmacology, Toxicology, and Therapeutic Use
 Absinthe
 Hashish
 Opium
 Laudanum
 Paregoric
 Dover's Powder
 Morphine
 Chloral
 Paraldehyde
 Hypnal
 Sulphonal
 Trional
 Urethane
 Hemlock
 Coniine
 Curari
 Chloroform
 Ether, or Di-Ethyl-Ether
 Nitrous Oxide
 Cocaine
 Digitalis
 Nux Vomica
 Strychnine
 Strophanthus
 Valerian
 Sparteine
 Aconite
 Hellebore
 Veratrine
 Tobacco
 Amyl Nitrite
 Nitroglycerin
 Belladonna
 Atropine
 Homatropine
 Sal Ammoniac
 Heroin
 Guaiacol
 Creosotol
 Calumba

Sodium
 Lime, or Calcium Oxide
 Apomorphine
 Asafœtida
 Senna
 Cascara Sagrada
 Castor Oil
 Blue Pill
 Calomel
 Rhubarb
 Aloes
 Seidlitz Powders
 Rochelle Salt
 Epsom Salt
 Jalap
 Colocynth
 Elaterin
 Bismuth
 Lead
 Lunar Caustic
 Diuretin
 Copaiba
 Methylene Blue
 Salol
 Jaborandi
 Iodoform
 Carbolic Acid
 Sulphurous Acid
 Antipyrine
 Phenacetine
 Acetanilid
 Matzoon
 Cod-Liver Oil
 Lanolin
 Ichthyol
 Salvarsan

VIII. HISTORY AND BIOGRAPHY.

1. *History:*

Medicine
 Homœopathy
 Eclectic School of Medicine
 Anatomy
 Histology

Physiology
Hygiene
Pathology
Disease, Germ Theory of
Therapeutics
Surgery
Surgery, Military
Obstetrics
Dentistry

2. *Biography:*

Hippocrates
Galen, or Claudius Galenus
Aretæus
Avicenna
Linacre, or Lynaker, Thomas
Paracelsus
Fracastoro, Girolamo
Fallopio, or Fallopius, Gabriel
Vesalius, Andreas
Eustachio, Bartolommeo
Paré, Ambroise
Fabricius, or Fabrizio, Girolamo
Harvey, William
Sydenham, Thomas
Pecquet, Jean
Graaf, Regnier de
Willis, Thomas
Malpighi, Marcello
Radcliffe, John
Leeuwenhoek, Antonius van
Boerhaave, Hermann
Hoffmann, Friedrich
Sloane, Sir Hans
Morgagni, Giovanni Battista
Swieten, Gerard van
Haller, Albrecht von
Pott, Percival
Brown, John
Cullen, William
Hunter, John
Perkins, Elisha
Auenbrugger, von, or Auen-
brugg, Leopold

Mesmer, Franz, or Friedrich-
Anton
Bell, John
Jenner, Edward
Baillie, Matthew
Pinel, Philippe
Post, Wright
Gall, Franz Joseph
Soemmering, Samuel Thomas
von
Scarpa, Antonio
Spurzheim, Johann Kaspar
Hufeland, Christoph Wilhelm
Physick, Philip Syng
Broussais, François Joseph
Victor
Ling, Pehr Henrik
Esquirol, Jean Etienne Domi-
nique
Cooper, Sir Astley Paston
Larrey, Dominique Jean
Bell, Sir Charles
Hahnemann, Samuel
Dieffenbach, Johann Friedrich
Wells, Horace
Morton, Samuel George
Priessnitz, Vincenz
Beaumont, William
Orfila, Matthieu Joseph Bona-
venture
Graves, Robert James
Ennemoser, Joseph
Magendie, François
Warren, John Collins
Amussat, Jean Zuléma
Hall, Marshall
Bright, Richard
Müller, Johannes
Forbes, Sir John
Francis, John Wakefield
Wagner, Rudolph
Mott, Valentine
Quain, Jones
Lawrence, Sir William

- Flourens, Marie Jean Pierre
Goodsir, John
Morton, William Thomas Green
Syme, James
Simpson, Sir James Young
Parrish, Edward
Holland, Sir Henry
Winslow, Forbes (Benignus)
Andral, Gabriel
Rokitansky, Karl, Baron
Bernard, Claude
Peaslee, Edmund Randolph
Long, Crawford W.
Wood, George Bacon
Taylor, Alfred Swaine
Seguin, Edouard Onesimus
Broca, Paul
Sims, James Marion
Parker, Willard
Gross, Samuel D.
Draper, John Christopher
Post, Alfred Charles
Flint, Austin
Kneeland, Samuel
Gray, John Perdue
Quain, Richard
Langenbeck, Bernhard Rudolph
von
Parker, Peter
Bright, Richard
Ricord, Philippe
Taylor, Isaac Ebenezer
Owen, Sir Richard
Earle, Pliny
Mackenzie, Sir Morell
Peters, John Charles
Moleschott, Jacob
Charcot, Jean Martin
Brown-Sequard, Charles Edouard
Pasteur, Louis
Tuke, Daniel Hack
Loomis, Alfred Lee
Dubois-Reymond, Emil Heinrich
Kneipp, Sebastian
Lusk, William Thompson
Quain, Sir Richard
Hart, Ernest Abraham
Pepper, William
Seguin, Edward Constant
Paget, Sir James
Taylor, Charles Fayette
Hammond, William Alexander
Virchow, Rudolph
Kussmaul, Adolph
Thomas, Theodore Gaillard
Davis, Nathan Smith
Thompson, Sir Henry
Esmarch, Johannes Friedrich
August von
Guernsey, Egbert
Lister, Sir Joseph
Emmet, Thomas Addis
Mitchell, Silas Weir
Jacobi, Abraham
Turner, Sir William
Recklinghausen, Friedrich von
Flint, Austin, Jr.
Smith, Andrew Heermance
Sternberg, George Miller
Carpenter, William Benjamin
Hansen, Gerard Henrik Armauer
Janeway, Edward Gamaliel
King, Albert Freeman Africanus
Wood, Horatio Curtis
Rayleigh, John William Strutt,
Baron
Koch, Robert
Laveran, Charles Louis Alphonse
Morton, William James
McBurney, Charles
Trudeau, Edward Livingston
Morselli, Enrico Agostino
Spitzka, Edward Charles
Lorenz, Adolph
Starr, Moses Allen .
Horsley, Victor Alexander Haden
Peterson, Frederick
Manson, Patrick

Flexner, Simon
Ehrlich, Paul
Wassermann, August von
Carrel, A.
Sullstrand, Allwar
Tiedemann, Friedrich
Mayo, Charles Horace
Mayo, William James

Richet, C. R.
Kossel, Albrecht
Behring, E. A. von
Ross, Sir R.
Metchnikoff, E.
Ramón y Cajal, S.
Pavlov, I. P.
Finsen, N. R.

Chapter 33. Manners and Customs

Dress and Apparel

NOWHERE more than in the apparel of men and women does time wreak its changes and the spirit of an age stand out. The student of the manners and customs of a people or period often may apply himself with profit to a consideration of their garments, and conversely in a study of the garments reflex actions on the wearer may be observed. Indeed, clothes may be subject to the dictates of a fickle fashion or possess a spiritual and deep-lying significance, as in the case of ecclesiastical vestments, or changing from the decorative to the more serviceable, as in the case of the military or naval uniform.

Thus costume in itself may possess a significance more than merely for the interest of the votary of fashion. For such a student a series of articles might be recommended embraced in the following list:

Costume
Dress
Textiles
Dress Reform
Armor
Fashion
Embroidery
Corset
Crinoline
Girdle
Glove
Hosiery
Mantle
Shawl
Hair Dressing

Beard
Cosmetics
Rouge
Perfumery
Wig
Hat
Headdress
Shoes
Boots
Jewelry
Parasol
Uniforms, Military and Naval
Costume, Ecclesiastical
Degree (for Academic Costume)

Jewelry

Among the minor arts in none have there been more important developments than in the artistic design and fabrication of jewelry. In many fields there may be considered to have taken place within recent years a return to the artistic products of the early gold- and silver-smiths of Continental Europe, while in the cutting and setting of

gems there has also been opportunity for the display of the skill of the lapidary and the jeweler, who have evolved new styles of cutting and forms of settings.

Under the broad heading of JEWELRY in this section can be considered the articles for personal adornment, involving the use of precious and semi-

precious stones and the careful working of such metals as gold and silver, and also the manufacture of objects of utility and ornament of a somewhat larger description, such as tableware and the artistically decorated porcelain and other objects of art.

The visitor to a museum of fine arts would often find grouped in a single department such articles as are embraced in the following list, which is submitted for the guidance of the reader:

Jewelry
Fan
Enamel
Embossing
Gems
Goldsmith Work
Inlaying
Lacquer Work
Lapidary Work
Japanese Art
Marquetry
Metal Work
Pearl
Plate
Porcelain
Pottery
Plated Ware
Repousée
Ring
Stained Glass
Table Ware
Tarsia Work
Fork
Cutlery

In connection with jewelry, it is desirable to refer also to the various gems which are used for personal adornment. The article GEMS, which discusses the general qualities of precious or beautiful stones, with partic-

ular reference to those cut or engraved for use as jewels or seals, describes the history of such ornaments from the earliest periods of Egypt. This is followed by an article on GEMS, IMITATION AND ARTIFICIAL, in which are discussed the various imitations ranging all the way from crude affairs of glass to modern triumphs of the chemist, involving the electric furnace as a means of producing the gems artificially or synthetically.

While precious stones used for gems may have considerable value, due to their rare occurrence in nature, it is the lapidary who, in his cutting, grinding and polishing the various crystals or other precious stones, adds to their value or even, in some cases, gives beauty and value to stones whose intrinsic value is but small. Accordingly, the article LAPIDARY WORK should be read in addition to that on gems, and then the reader can take up the series of articles on the precious stones themselves—naturally headed by the diamond. These arrange themselves into two groups—those of great rarity and value, as follows:

Diamond
Emerald
Ruby
Sapphire
Amethyst
Opal
Carnelian
Turquoise
Topaz

The second group comprises many, mostly crystalline minerals, that are also considered as precious, but whose rarity is not such as to put them in

the same class with the list just given.

Such minor stones would be:

Corundum

Quartz

Beryl

Chrysoberyl

Aquamarine

Tourmaline

Alabaster

Chalcedony

Sardonyx

Argonite

Agate

Jasper

Chrysolite

Garnet

Rhodonite

Chrysocolla

Catlinite

Chapter 34. Games and Sports

ALL peoples indulge in exercises of strength, of skill, of bodily and mental agility, or of fortune, and often these mimic the more serious pursuits of life, or consist in these very pursuits indulged in for pleasurable purposes only.

1. The capture and slaying of animals has remained a source of pleasure long after it has ceased to be the chief business of life. See:

(a) Shooting

Archery

Trapping

Coursing

Battue

Tiger-hunting

Still-Hunting

Fox-hunting

Falconry

Game Laws

Game Preserves

(b) Angling

Bait-fishing

Salmon-fishing

Trolling

Trout-fishing

Fly-Casting

2. The mimicry of war is also found in contests between men or animals, or men and animals. See:

Pugilism

Boxing

Wrestling

Fencing

Cock-fighting

Bear-baiting

Bull-fight

3. Water, both in its common state and in the forms of ice and snow, furnishes many forms of sport to primitive and civilized man. See:

(a) Swimming

Rowing

Canoe and Canoeing

Yachting

Water Polo

(b) Skating

Ice Polo

Ice Yachting

Curling

(c) Snowshoeing

Skiing

4. Useful to man in labors, the horse is his great companion in numerous sports. See:

Horsemanship

Coaching

Driving

Trotting

Pacing

Horse-racing

Stud-book

Derby Day

Steeple chasing

Polo

Hippodrome

5. Of the instruments entering into popular games, the ball, in various shapes, is by far the most common and the most widespread. See:

Bowls

Baseball

Indoor Baseball

Cricket

Golf

Croquet

Hockey

La Crosse

Polo

Football

Basketball

Handball

Pelota

Racquets

Tennis

Lawn Tennis

Court Tennis

Ping-Pong

Billiards

Bagatelle

6. In games of chance, the card and the die in varying forms are universally found. In the case of cards, however, chance often plays the minor part and the game assumes a highly intellectual character. See:

(a) Cards

Whist

Bridge

Pinochle

Skat

Ecarté

Piquet

Bezique

Cribbage

Euchre

Solitaire

Poker

Baccarat

Rouge et Noir

Fan-tan

(b) Dice

Hazard

Craps

(c) Roulette

7. For the great intellectual games par excellence, see:

Chess

Checkers

and for cognate games:

Backgammon

Dominoes

8. Miscellaneous sports and games:

Cycling

Mountain Climbing

Coasting

Toboggan

Shuffleboard

Quoits

9. The general subject is treated under:

Athletics

Gymnastics

Physical Culture

Amateur

Handicapping

Sports, Book of

Games, Ancient

Gymkhana

Olympic Games

Pythian Games

Nemca

Gladiator

Circus

Acrobat

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